Chronic Disease Report

Missouri Department of Health

Division of Chronic Disease Prevention
and
Health Promotion

2000

Suggested Citation

Simoes EJ, Holt B, Miller N. Chronic Disease Report.
Columbia, MO:
Missouri Department of Health,
Division of Chronic Disease Prevention and Health Promotion, 2000.

To order a copy of this publication, contact:

Missouri Department of Health,
Division of Chronic Disease Prevention and Health Promotion,
920 Wildwood
Jefferson City, MO 65109
(573) 522-2803

Chronic Disease Report

Authors:
Eduardo J. Simoes, MD, MSc, MPH
Brigitte Holt, PhD
Nancy Miller, MEd, CHES

Contributors:
Heather L. Ramsay, MA
Patrick Akinbola, PhD
Jian C. Chang, PhD
Theo Murayi, PhD
Bernard Malone, MPA
Jeannette Jackson-Thompson, PhD, MSPH
Nicola Hagdrup, MD, MPH

Missouri Department of Health,
Division of Chronic Disease Prevention and Health Promotion,
2000

Acknowledgments:

For editorial contributions:
Jim McDonald
Susanne D'Isabel

For text design, table preparation, and clerical support:
Jamie Strawn

TABLE OF CONTENTS

Introduction _____ ii
Using This Publication _____ iii
Methods _____ v
Limitations _____ vii

Missouri Trends

Missouri Trends _____ viii
How Missouri Mortality Compares to the US _____ ix
Prevalence of Risk Factors/Screening
Missouri Compared to US _____ x
Year 2000 Health Objectives for the Nation:
State Summary of BRFSS Data for 1999 _____ xi

Trends in Cardiovascular Disease

Cardiovascular Disease Mortality _____ 2
Ischemic Heart Disease Mortality _____ 3
Cerebrovascular Disease (Stroke) Mortality _____ 4
Hypertension Prevalence _____ 5

Trends in Cancer

All Cancer Incidence and Mortality _____ 8
Lung Cancer Incidence and Mortality _____ 11
Breast Cancer Incidence and Mortality _____ 13
Colorectal Cancer Incidence and Mortality _____ 15
Cervical Cancer Incidence and Mortality _____ 17
Prostate Cancer Incidence and Mortality _____ 19

Trends in Other Chronic Diseases

Chronic Obstructive Pulmonary Disease Mortality _____ 22
Diabetes Prevalence and Mortality _____ 23
Smoking-attributable Mortality _____ 25
Arthritis Prevalence _____ 27

Chronic Disease-related Risk Factors and Screening Tests

Prevalence of Smoking _____ 30
Prevalence of Leisure-time Physical Inactivity _____ 31
Prevalence of Overweight _____ 32
Prevalence of Fruit and Vegetable Consumption _____ 33
Prevalence of Cholesterol Screening _____ 34
Prevalence of Mammography Screening _____ 35
Prevalence of Pap Screening _____ 37
Prostate Cancer Screening Methods Used by Physicians _____ 39

Special Topics

Missouri's Aging Population _____ 42
Health Care Coverage _____ 44
Chronic Disease Risks Among Youth _____ 45

References

_____ 46

Missouri Department of Health Chronic Disease Published Research

_____ 49

Introduction and Scope

The five leading causes of death in Missouri are chronic diseases, namely: ischemic heart disease (IHD) and other diseases of the heart, cancer, stroke and chronic obstructive pulmonary disease (COPD). Another chronic disease, diabetes, is the seventh leading cause of death. In 1998, 70.8 percent (38,834) of all deaths in Missouri were chronic diseases. Missouri mortality rates of cardiovascular disease, ischemic heart disease, stroke, lung cancer, colorectal cancer, and breast cancer are above the US average. Much of chronic disease morbidity and mortality occurs before age 75 (life expectancy), with 40.2% of all deaths occurring before then. Additionally, chronic conditions such as arthritis and chronic joint symptoms are responsible for a substantial amount of morbidity, activity limitation and health care costs.

It has been estimated that primary risk factors such as smoking, physical inactivity and a diet high in fat and low in fiber (i.e. including eating fewer than five fruits and vegetables a day) are responsible for nearly 50 percent of all chronic diseases (McGinnis and Foege, 1993). Cigarette smoking is the chief preventable cause of premature death in the US, causing 430,000 deaths annually. In Missouri, we estimated that 10,442 deaths in 1995 (i.e., 19.3% of all deaths), were attributable to smoking (Miller et al, 1997). That is equivalent to the annual loss of a population living in counties such as Carroll (pop. 10,400), Lewis (pop. 10,200), or Grundy (pop. 10,400). Compared to other states, Missouri ranks 5th (1997) for the prevalence of current smoking in high school students and 6th (1998) for current smoking among adults 18 or older.

As much as 30 percent of all cancer can be prevented with a diet low in fat and rich in fruits, vegetables, grains and related nutrients (World Cancer Research Fund, 1997). Nevertheless, fruit and vegetable intake in Missouri is poor, with only 20 percent of the adult population consuming the recommended five servings a day. Lack of physical activity is another important contributor to the burden of chronic diseases, particularly in relation to cardiovascular diseases, colorectal cancer, diabetes and functional limitation attributed to obesity and arthritis. An estimated approximately 12 percent of total deaths (i.e., over 260,000 deaths) in the United States are caused by lack of physical activity (Hahn et al, 1986) (McGinnis and Foege, 1993). Still, 27.9 percent of the Missouri population age 18 or older are physically inactive and only 19 percent get the amount of exercise recommended by the Surgeon General, that is being physically active at least five days a week for 30 minutes or more.

In addition, preventive screenings for high blood cholesterol, high blood pressure, and breast, cervical and colorectal cancer can substantially reduce chronic disease mortality. For example, it has been estimated that having a mammogram on a regular basis can potentially reduce over 30 percent of all breast cancer deaths among women age 50 or older (Kerlikowsky et al, 1995). However, 21 percent of Missouri women over age 40 still have never had a mammography and clinical breast exam. Among those who have been screened, only 66 percent of women aged 50 and over had a repeat screening within the recommended interval of every two years.

Between 1996 and 2000, the Missouri Department of Health's Division of Chronic Disease Prevention and Health Promotion developed and implemented a strategy for translating, communicating and disseminating chronic disease surveillance and epidemiological data for public health policy decisions and planning prevention programs in Missouri. The purpose of this monograph is fourfold: 1) to compile and summarize, in one volume, the translation of Missouri's chronic disease, related risk factors and preventive measures reports; 2) to make data available periodically and in a timely fashion to chronic disease program managers; 3) to present information about chronic diseases in an easy-to-read format and with graphical representation; and 4) to orient the reader to more in-depth reports that have been published or made available through a shared network site.

Using this publication

This monograph summarizes relevant data published during the past four years regarding trends and predictions in chronic diseases, risk factors and preventive measures data. Its purpose is to help program managers in defining the magnitude, urgency and severity of chronic diseases. The report identifies racial-ethnic disparities and target populations affected deeply by chronic diseases, and examines factors likely to have an effect on chronic disease prevention strategies.

A quick review of the first three sections should help the reader identify chronic disease indicators that should be priorities because so many are worse than those of the United States and most will not reach the US Year 2000 objectives. This information provides a basis for identifying achievable objectives for use in strategic planning.

The first section, **Missouri Trends**, provides an overview of Missouri's chronic diseases and related factor trends over the past twenty years. It indicates whether Missouri's chronic

disease and related indicators have moved in the right or wrong direction. For example, trends of chronic obstructive pulmonary disease mortality (COPD) among Missouri's women indicates that this condition, an already significant public health problem, is increasing 4.5 percent annually (and 7% among African-American women) and the rate in women will surpass that in men by the year 2006. This finding makes COPD a priority health problem for women in Missouri.

How Missouri Compares to the US shows the status of various Missouri indicators in relation to those in the United States, and indicates whether Missouri's indicators are worse or better. For example, the incidence of colorectal cancer is similar among African-American and white men in Missouri and their counterparts in the US. Yet, colorectal cancer mortality in Missouri's African American men is greater than in whites in Missouri and African Americans nationwide.

The third section, **Year 2000 Health Objectives for the Nation**, compares the status of risk factors in Missouri with those delineated in the national year 2000 objectives. For example, despite recent increases in mammography use in Missouri, rates for repeat screening every two years is much lower than expected based on the Year 2000 Objectives.

The remaining sections of the report are distributed in five chapters: **Trends in Cardiovascular disease, Trends in Cancer, Trends in other Chronic Diseases, Chronic Disease-related Risk Factors, Screening Tests, and Special Topics.** The sections are listed in order of importance for chronic disease prevention in Missouri. For example, cardiovascular disease as the leading cause of death and morbidity comes first and is followed by cancer and other chronic diseases in order of priority. The primary risk factors are followed by the secondary preventive measures. Within the primary risk factors, smoking is presented first, followed by obesity, physical inactivity, and fruits and vegetables consumption.

The program manager can use these sections to glean useful information for program planning, identification of target populations and monitoring of progress towards desired objectives. In nearly all sections, one can find useful information for determining whether a public health strategy should be delivered to the whole population or a segment at higher risk for some negative health conditions. For example, data in **Trends in Other Chronic Diseases** demonstrate that diabetes mortality and prevalence are much higher among African Americans than in whites. It also shows that the prevalence is higher in the Bootheel region than state-

wide. Information in the **Trends in Cardiovascular Disease** section supports a strategy of targeting African-American men in the cities of St. Louis, Kansas City and the Bootheel region with individual-based health promotion and comprehensive population-based strategies towards reducing risk factors for cardiovascular disease.

In **Chronic Disease-related Risk Factors and Screening Tests**, one can find information on barriers and enabling factors affecting fruit and vegetable intake in Missouri. The main barriers identified were: 1) confusion on the messages due to many and conflicting messages from the media and the scientific community; 2) availability and cost of fruits and vegetables; and 3) information on food preparation. The section also identifies independent factors affecting compliance with recommended Pap smear screening every three years in Missouri. Major factors identified were: 1) being of old age and having low education attainment; 2) having had other cancer screening such as mammography; 3) having health insurance; or 4) or not experiencing a cost barrier when seeking medical care.

Methods

This report is a compilation of smaller reports, monographs and published manuscripts from the Division of Chronic Disease Prevention and Health Promotion over the past four years. As such, no attempt was made to select the reports or articles using any specific criteria: all reports and articles are included. The epidemiological and statistical methods utilized in the original reports are described in each report's methods section.

In order to provide readers of this report with adequate tools for interpretation of the information in this report, the following list of definitions should be helpful:

Bias
Deviation of results or inference from the truth, or process leading to such deviation.

Census
An enumeration of a population, by law, every 10 years.

Confidence Interval
A range of values for a variable of interest constructed so that this range has a specified probability of including the true values of the variable.

Cross-sectional Study
A study that examines the relationship between diseases (or other health characteristics) and other variables of interest as they exist in a defined population at one particular point in time.

Crude
Crude is a term used to describe a statistic that is not adjusted to other factors.

Crude Rate
Crude rate is the actual rate for disease incidence and mortality unadjusted to other factors. Since crude rates accurately describe the burden of disease, they should be used for planning purposes.

Evaluation
The systematic assessment of the relevance, adequacy, progress, efficiency, effectiveness, and impact of health programs.

Exposed
The exposed group is often used to connote a group whose members have been exposed to a supposed cause of disease or health status of interest in a study.

Incidence
Number of new cases occurring over a period of time in a population at risk that has been followed up.

Incidence rate
Number of new cases occurring over a year in a population at risk divided by the population estimated at mid point in the year.

Odds
The probability that a particular event will occur divided by the probability that the event will not occur.

Odds ratio
The odds of a particular exposure among persons with a specific disease (or other outcome) divided by the corresponding odds of exposure among persons without the disease (or other outcome) of interest.

Perceived Health
Self-reported subjective health.

Population Attributable Risk
The incidence of a disease in a population that is attributable to exposure to the risk factor.

Prevalence
The number of events of a disease or other condition in a given population at a designated point or period of time.

Prevalence Rate
The proportion of individuals from an at risk population with a certain attribute, disease or other condition at a specific point, or period in time.

Prevention
Measures to prevent occurrence of disease or arrest its progress and reduce its consequences once it is established. Primary prevention seeks to prevent the initial occurrence of disease or condition. Secondary prevention seeks to arrest or retard existing disease through early detection. Tertiary prevention seeks to arrest development of sequelae once disease or condition is established.

Public Health
Public Health is an organized effort to protect, promote and restore health; the science, skills and beliefs that are directed to the maintenance and improvement of the health of all people through collective or social actions.

Risk Factor
An aspect of personal behavior or lifestyle, an environmental exposure or an inborn or inherited characteristic known to increase risk of a disease or health condition.

Secular Trend
Changes over a long period of time, generally years or decades.

Standardized (Adjusted)
A set of techniques used to remove as far as possible the effects of differences in age or other confounding variables when comparing two or more populations. (Last JM. Dictionary of epidemiology-3rd ed. Oxford University Press, 1995)

Standardized (Adjusted) Rate
A standardized rate is adjusted to a third factor considered as a risk for the outcome and associated with the factor of interest. The effect of such third factors may mix with that of the factor of interest on the outcome, making interpretation of the true effect misleading. For example, in comparing mortality (outcome) between two regions (factor of interest), differences in age structure between the two populations (third factor) may account for the observed mortality rate difference (outcome indicator). Therefore, adjustment to age makes the comparison fair by eliminating age difference between the two regions. However, age-adjusted rates are artificial, as they do not reflect actual disease burden. Therefore, they should not be used for planning purposes. Instead, they are ideal for comparisons between sub-populations defined by demographics and geography.

Limitations

Many of the limitations of this report are related to those of telephone-based prevalence surveys, registry-based incidence and death record-based surveillance systems. Data from chronic disease surveillance in Missouri were used for the absolute majority of reports utilized in this summary. Estimates of completeness for specific cancer sites are not available. Death records have been reported to be biased (under- or over-estimated) for some diseases like diabetes and kidney failure. It is possible that some of the diseases studied will suffer from misclassification as has been reported for COPD and asthma. Data from the Behavioral Risk Factor Surveillance System (BRFSS) for the majority of indicators used in our reports have been deemed valid and sensitive. For a more complete review of the limitations of the reported information, we recommend the reader search for the appropriate methods and discussion sections in the peer reviewed and other reports used in this report and listed in the reference section.

Missouri Trends

Incidence*

- ✔ all cancer incidence
- ✔ breast cancer incidence
- ✔ cervical cancer incidence
- ✔ lung cancer incidence (female)
- ✔ prostate cancer incidence

Death*

- ✔ all cancers deaths
- ✔ chronic obstructive pulmonary disease deaths
- ✔ diabetes-related deaths
- ✔ lung cancer deaths (female)
- ✔ prostate cancer deaths
- ✔ stroke deaths

Prevalence**

- ✔ prevalence of obesity
- ✔ prevalence of hypertension
- ✔ pap smear screening (African-American female)
- ✔ health care coverage (African-American male)

Incidence*

- ✔colorectal cancer incidence
- ✔ lung cancer incidence (male)

Death*

- ✔ cardiovascular disease deaths
- ✔ colorectal cancer deaths
- ✔ ischemic heart disease deaths
- ✔ all cancers deaths (African-American male)
- ✔ lung cancer deaths (African-American male)

Prevalence**

- ✔ mammography screening
- ✔ cholesterol screening

No Change

Death*

- ✔ breast cancer deaths
- ✔ cervical cancer deaths

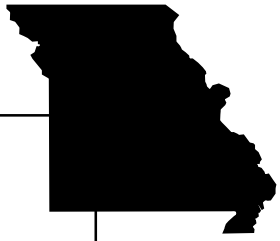
Prevalence**

- ✔ prevalence of smoking
- ✔ pap smear screening (white female)

*** Source: (Simoes et al., 2000)*
**Source: (Simoes et al., 1999b)*

How Missouri Mortality Compares to the US – 1996

Age-adjusted mortality rates per 100,000 population



Missouri is Better

Prostate Cancer
(MO = 21.8 US = 24.1)**

Diabetes
(MO = 13.0 US = 13.6)*

US is Better

All Cancer
(MO = 172.5 US = 166.9)**

Lung Cancer
(MO = 55.5 US = 48.8)**

Breast Cancer (Female)
(MO = 23.8 US = 13.6)**

Colorectal Cancer
(MO = 17.6 US = 16.8)**

Cardiovascular Disease
(MO = 190.4 US = 170.7)*

Ischemic Heart Disease
(MO = 106.7 US = 86.7)*

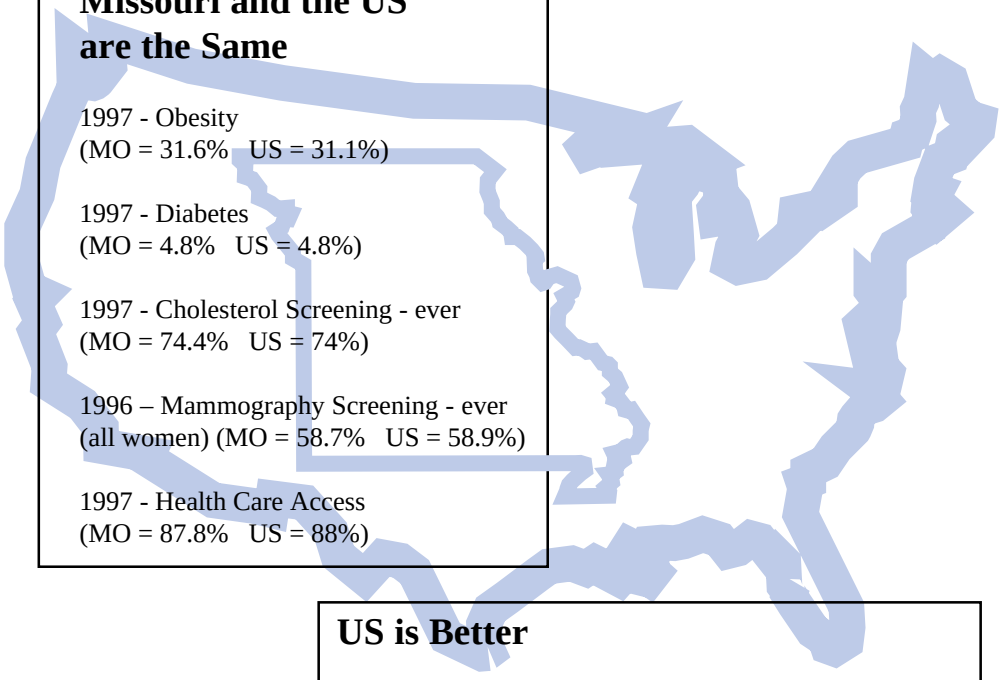
Cerebrovascular Disease
(MO = 27.9 US = 26.4)*

Chronic Obstructive Pulmonary Disease
(MO = 22.9 US = 21.0)*

** 1940 Age-adjusted*
*** 1970 Age-adjusted*
Source for Missouri data: (Simoes et al., 1999b)
Source for US data: National Center for Health Statistics

Prevalence of Risk Factors and Screening

Missouri vs. United States (US) — 1996-1997



Missouri and the US are the Same

1997 - Obesity
(MO = 31.6% US = 31.1%)

1997 - Diabetes
(MO = 4.8% US = 4.8%)

1997 - Cholesterol Screening - ever
(MO = 74.4% US = 74%)

1996 – Mammography Screening - ever (all women) (MO = 58.7% US = 58.9%)

1997 - Health Care Access
(MO = 87.8% US = 88%)

US is Better

1997 - Smoking
(MO = 28.6% US = 23.2%)

1996 - Physical Activity
(MO = 69.8% US = 72.3%)

1996 - Fruit and Vegetable Consumption
(MO = 22.6% US = 23.6%)

1997 – Pap Smear Screening-Within 3 years (all women)
(MO = 83.0% US = 86.5%)

1997 - Hypertension
(MO = 27.3% US = 23.0%)

Source:
Data are from the US Centers for Disease Control and Prevention

Year 2000 Health Objectives for the Nation:
State Summary of BRFSS[1] Data for 1999

Year 2000 Health Objectives for the Nation:

State summary of BRFSS[1] data for 1999

Healthy People 2000[2] Objective[3]	Yr 2000 US Target	Missouri, 1999
Overweight		
(Objective #1.2) Ages ≥18	≤20%	35.5%
Regular and Sustained Physical Activity		
(Objective #1.3) Ages ≥18	≥30%	19.1% (1998)
Regular and Vigorous Physical Activity		
(Objective #1.4) Ages ≥18	≥20%	11.4% (1998)
No Leisure-time Physical Activity		
(Objective #1.5) Ages ≥18	≤15%	27.9% (1998)
Ages ≥65	≤22%	42.6% (1998)
Cigarette Smoking		
(Objective #3.4) Ages ≥18	≤15%	27.1%
Cholesterol Screening (within past five years) (Objective #15.14)		
Ages ≥18	≥75%	65.7%
Fruit and Vegetable Consumption (five or more servings per day) (Objective #16.8)		
Ages ≥18	N/A	20.1% (1998)
Clinical Breast Exam and Mammogram (ever had) (Objective #16.11)		
Women ages ≥40	≥80%	76.8%
Clinical Breast Exam and Mammogram (within past two years) (Objective #16.11)		
Women ages ≥50	≥60%	64.9%
Pap Smear, Women with Intact Uterine Cervix (ever had) (Objective #16.12)		
Ages ≥18	≥95%	94.6%
Ages ≥70	≥95%	89.8%
Hispanics, ages ≥18	≥95%	91.9%
Low-income women ages ≥18 (annual family income <$15,000)	≥95%	90.2%

Healthy People 2000[2] Objective[3]	Yr 2000 US Target	Missouri, 1999
Pap Smear, Women with Intact Uterine Cervix (within past three years) (Objective #16.12)		
Ages ≥18	≥85%	84.7%
Ages ≥70	≥70%	63.7%
Hispanics, ages ≥18	≥80%	97.3%
Low-income women ages ≥18 (annual family income <$15,000)	≥80%	73.3%
Sigmoidoscopy (ever had) (Objective # 16.13)		
Ages ≥50	≥40%	38.0%
Fecal Occult Blood Test (using home kit within two years) (Objective # 16.13)		
Ages ≥50	≥50%	30.0%
Influenza Immunization (within past year) (Objective #20.11)		
Ages ≥65	≥60%	68.4%
Pneumococcal Pneumonia Immunization (ever had) (Objective #20.11)		
Ages ≥65	≥60%	52.8%

[1]Behavioral Risk Factor Surveillance System, 1999.

[2]Public Health Service. Healthy People 2000: National Health Promotion and Disease Prevention Objectives—full report with commentary. Washington, DC: U.S. Department of Health and Human Services, 1991.

[3]In some cases, BRFSS definitions of objectives differ slightly from those in Healthy People 2000. See Healthy People 2000 for the exact definition of the objective.

Trends in Cardiovascular Disease

Cardiovascular Disease Mortality _____ *2*

Ischemic Heart Disease Mortality _____ *3*

Cerebrovascular Disease (stroke) Mortality ___ *4*

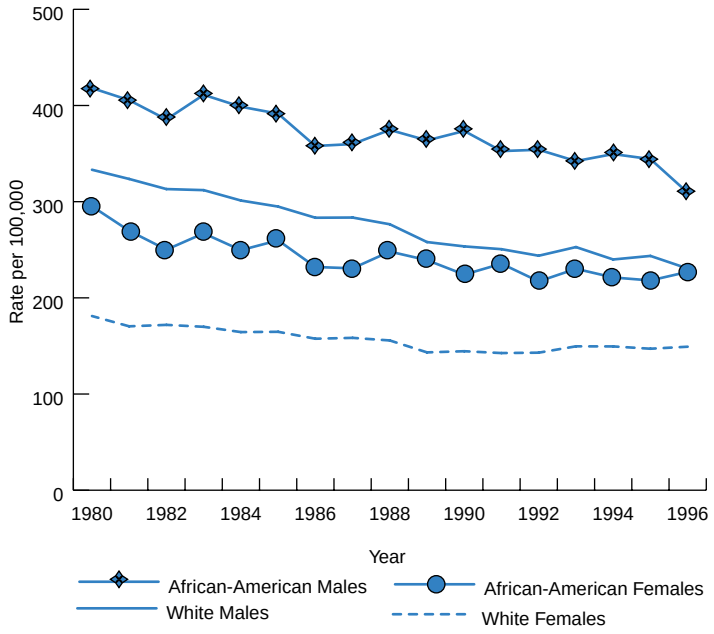
Hypertension Prevalence _____ *5*

Cardiovascular Disease Mortality

In 1996, deaths from cardiovascular disease (CVD) accounted for about 34 percent of all deaths in Missouri (Missouri Department of Health, 2000). Overall CVD mortality dropped by 23 percent between 1980 and 1996, with the greatest and lowest rates of decline among white males and white females, respectively (Figure 1) (Simoes et al., 1999b).

While all groups showed declines in CVD rates between 1980 and 1996, differences remain by race and sex. Among African Americans, for example, the rate of CVD mortality is 42 percent higher than in whites (Simoes et al, 1999b).

Figure 1: Missouri Annual Age-adjusted Mortality Rates for Cardiovascular Disease, by Race and Sex (1980-1996)

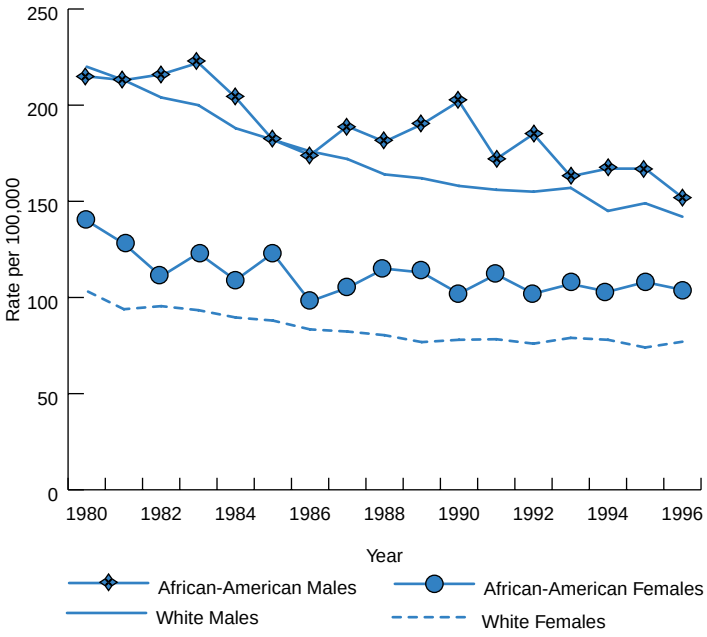


Ischemic Heart Disease Mortality

Mortality rates of ischemic heart disease (IHD) declined by 29 percent between 1980 and 1996 (Figure 2). During that period, the greatest decline was seen in males. There is a disparity between African American and white IHD mortality rates, primarily due to a 34 percent greater mortality between African-American and white females (Simoes et al., 1999b).

During the period 1990 to 1996, IHD mortality declined by 6 percent overall, with the greatest decline among African-American males (15%).

Figure 2: Missouri Annual Age-adjusted Mortality Rates for Ischemic Heart Disease, by Race and Sex (1980-1996)

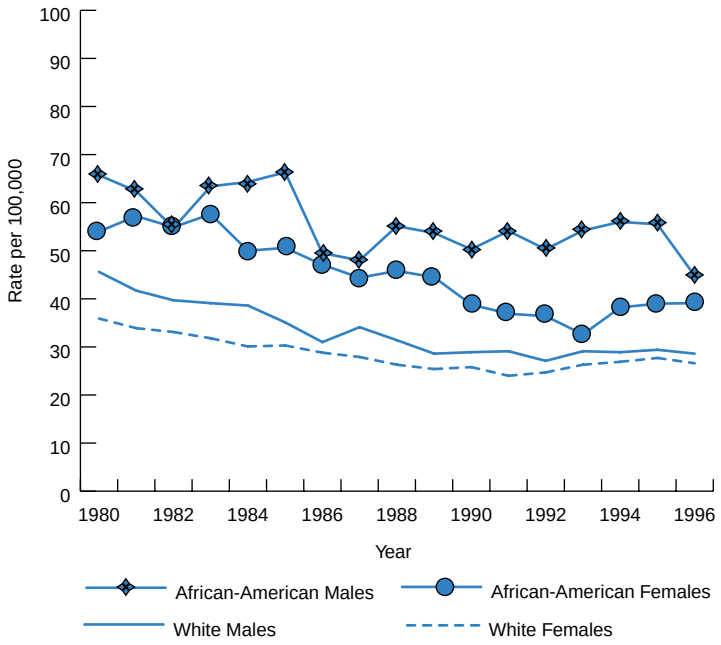


Cerebrovascular Disease (Stroke) Mortality

Cerebrovascular disease, more commonly referred to as stroke, decreased 28 percent between 1980 and 1996 (Figure 3). African-American mortality is 64 percent greater than white mortality (Simoes et al., 1999b).

The latter part of the period (1990-1996), however, saw small but not significant increases among females (Simoes et al., 1999b). Projection data for stroke mortality predict continued increases among females and small declines among African-American males.

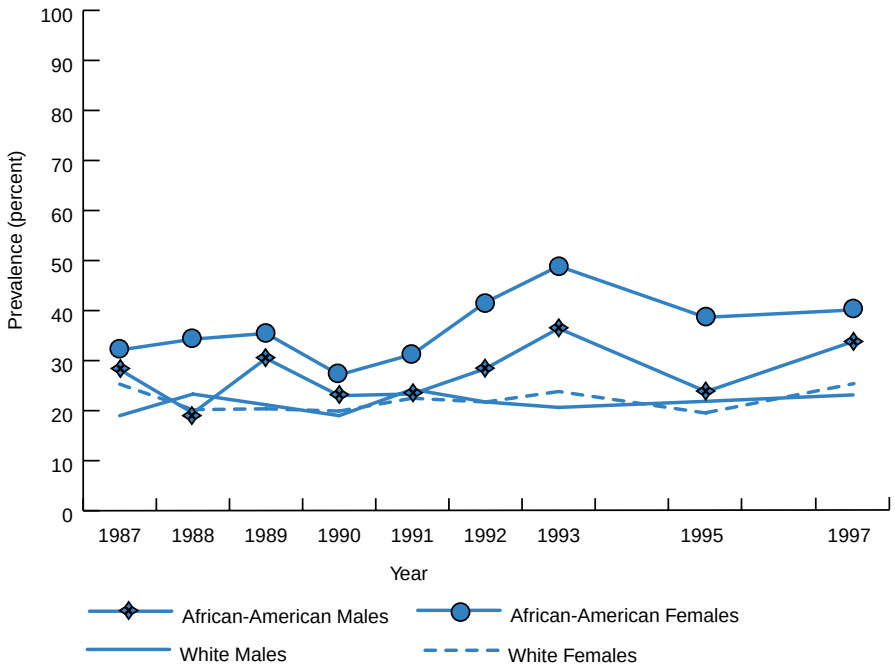
Figure 3: Missouri Annual Age-adjusted Mortality Rates for Stroke, by Race and Sex (1980-1996)



Hypertension Prevalence

Prevalence rates for hypertension, often referred to as high blood pressure, rose slightly, but not significantly, between 1987 and 1997 (Figure 4). Individuals with less than a high school education, those age 45 and older, African-Americans, and males account for the largest part of the increase in hypertension prevalence (Missouri Department of Health, 1998). Prevalence rates among African-Americans are at least 34 percent higher than those found in whites, and the trend is expected to continue (Simoes et al., 2000).

Figure 4: Missouri Annual Age-adjusted Weighted Prevalence Rates of Hypertension, by Race and Sex (1987-1997)*



**Data on hypertension were not collected in 1994 and 1996.*

Trends in Cancer

All Cancer Incidence and Mortality _____ *8*

Lung Cancer Incidence and Mortality _____ *11*

Breast Cancer Incidence and Mortality _____ *13*

Colorectal Cancer Incidence and Mortality __ *15*

Cervical Cancer Incidence and Mortality ____ *17*

Prostate Cancer Incidence and Mortality ____ *19*

All Cancer Incidence and Mortality

From 1985 to 1992, Missouri cancer incidence rates rose significantly (Figure 5). This increase was much higher in males (28%) than females (4%) (Robling et al., 1998). Cancer incidence rates rose in both whites (17%) and African-Americans (11%). Missouri cancer incidence rates were lower than US rates.

Cancer is the second leading cause of death in Missouri. Between 1980 and 1996, overall cancer-related mortality rates increased four percent, while increasing nearly eight percent among females (Simoes et al., 1999b) (Figure 6). During that time, cancer death rates for Missouri African-Americans exceeded those of white Missourians by 43 percent. However, African-American males experienced a significant decline of 13 percent in cancer mortality between 1990 and 1996 (Simoes et al., 1999b). From 1985 to 1994, Missouri cancer-related mortality rates paralleled those of the nation (Robling et al., 1998).

Missouri cancer incidence and mortality burden was most heavily influenced by cancer of the lung (Figures 7 and 8). Between 1985 and 1992, sites greatest in cancer incidence, following lung, were the female breast, colon/rectum, prostate and cervix uteri. Following lung cancer mortality, prostate, colon/rectum, female breast, and ovary were leading sites in cancer deaths between 1985 and 1994 (Robling et al., 1998). The increase in breast, cervical and prostate cancer incidence rates across all groups by race and gender, is most likely a result of an aging population and the fact that cancer is, primarily, a disease of older age groups.

Figure 5: Missouri Annual Age-adjusted Incidence Rates* for All Cancers, by Race and Sex (1985-1992)

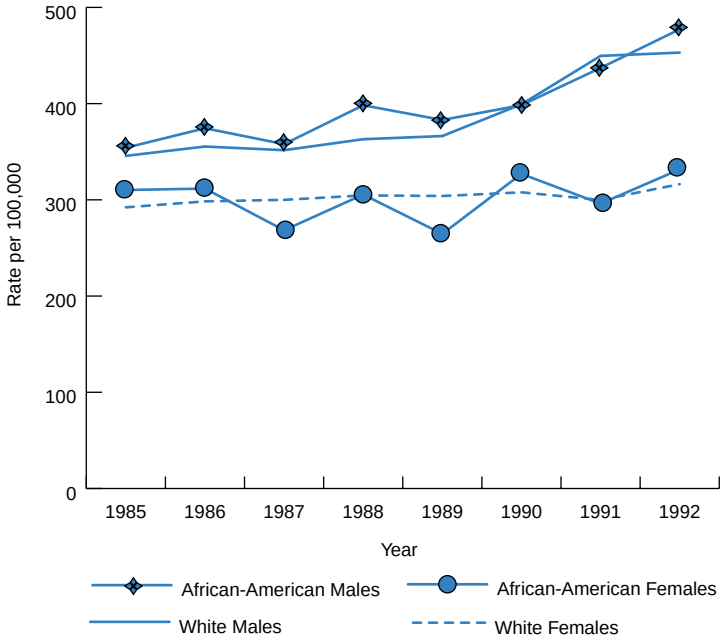
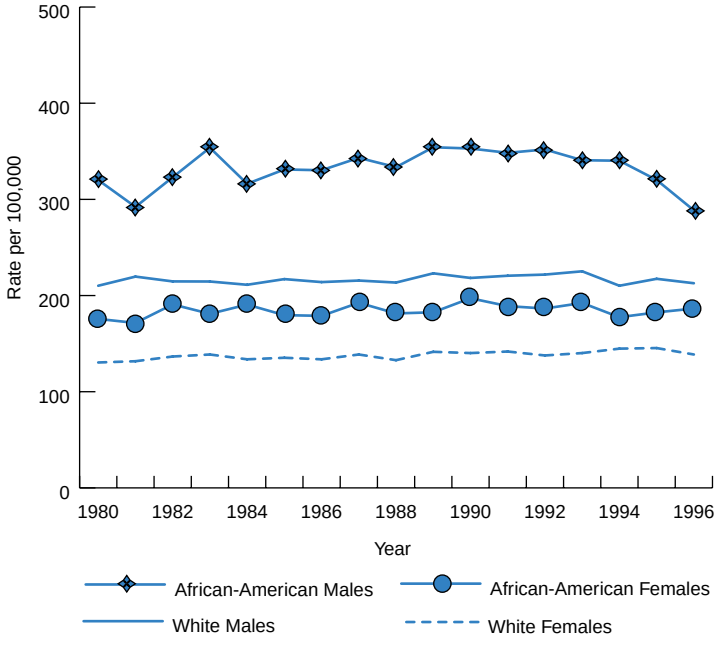


Figure 6: Missouri Annual Age-adjusted Mortality Rates* for All Cancers, by Race and Sex (1980-1996)



**Age standardized to the 1970 US population*

Figure 7: Contributions of specific sites to incidence of all cancers (1985-1992) *

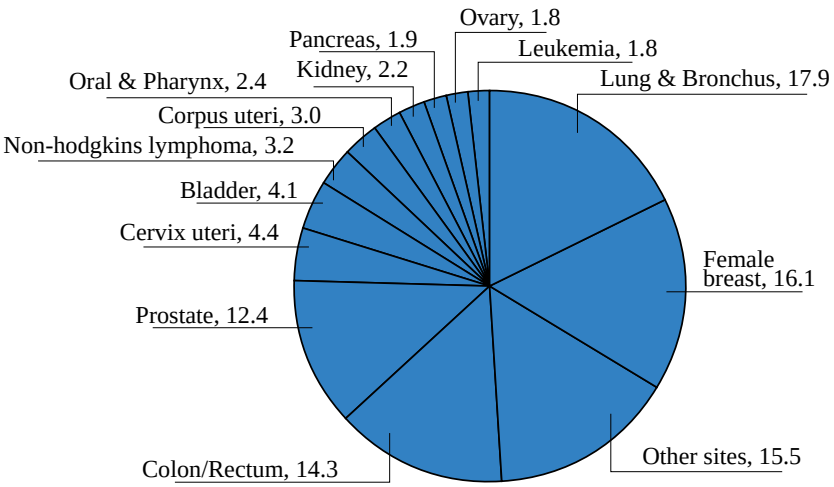
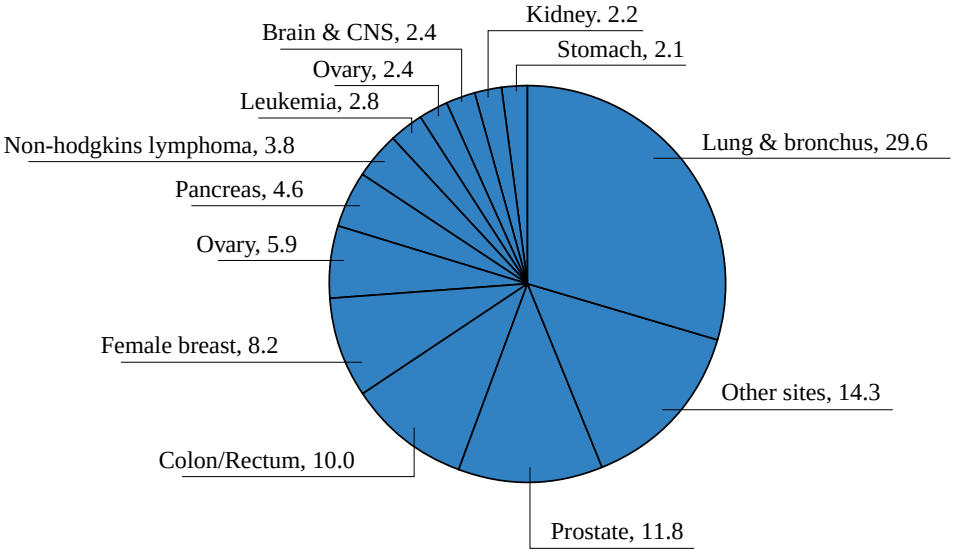


Figure 8: Contributions of specific sites to mortality from all cancers (1985-1994)*



**Percentages may not add up to 100%, due to rounding of disease-specific percentages.*

Lung Cancer Incidence and Mortality

Between 1985 and 1992, Missouri lung cancer incidence rates increased significantly among females (Figure 9). For Missourians under 65, incidence rates of lung cancer were significantly lower in whites than in African Americans, while for those ages 65 and over, the pattern was reversed (Miller et al., 1999). The lower incidence rates seen in older African-American age groups, relative to whites, is a result of African Americans with lung cancer dying before they reach the 65 or older age group. Current rates and future projections for lung cancer incidence estimate continuing trends of substantially higher rates for females and African American rates exceeding those of whites.

Lung cancer deaths in Missouri increased significantly (22%) between 1980 and 1996 (Figure 10). This increase was much higher for females (66%) than males (5%) (Simoes et al., 1999b). In addition, African-Americans were 32 percent more likely to die of lung cancer than whites.

Missouri trends in lung cancer-related deaths mirror national trends, with significant increases up to 1990, followed by significant reductions in death rates (Miller et al., 1999). Estimated projections indicate continued substantial increases over the next five years among women, and decreases in lung cancer-related deaths in men.

Figure 9: Missouri Annual Age-adjusted Incidence Rates* of Lung Cancer, by Race and Sex (1985-1992)

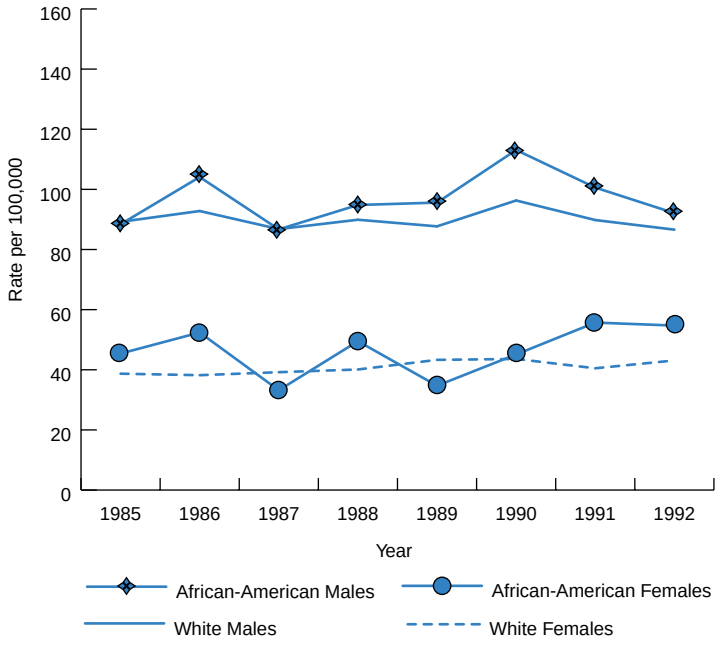
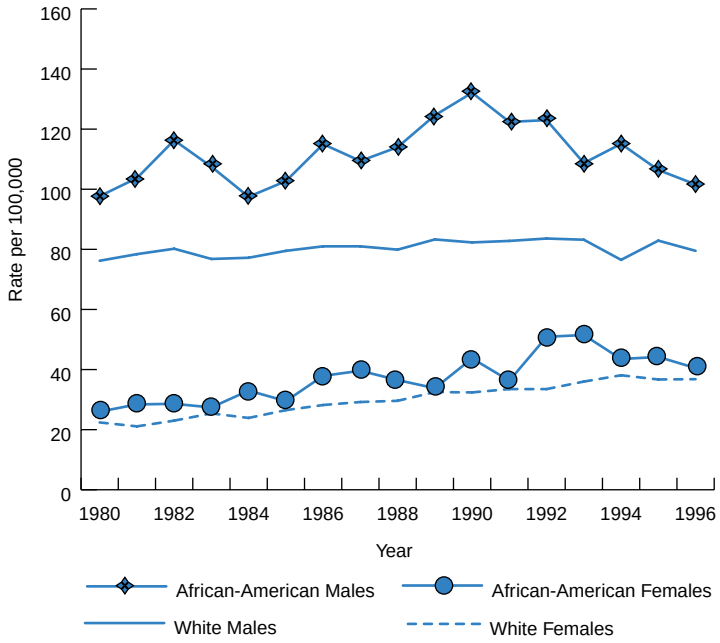


Figure 10: Missouri Annual Age-adjusted Mortality Rates* of Lung Cancer, by Race and Sex (1980-1996)



**Age standardized to the 1970 US population*

Breast Cancer Incidence and Mortality

Among females in Missouri as in the US, breast cancer is the leading site of new cancer cases and the second leading cause of cancer deaths. Missouri incidence rates for breast cancer fluctuated between 1985 and 1992, with no significant changes. Rates among white females were 20 percent higher than in African-American females (Figure 11). In addition, incidence rates for Missourians 65 and over were five to six times higher than those for younger Missourians (Holt et al., 1998).

Overall, breast cancer mortality also showed no change between 1980-1996 (Figure 12). Mortality rates for African Americans under 65 were 37 percent higher than those of whites in the same age group, compared with a five percent difference in the 65 and over group. White females from Missouri were less likely to die of breast cancer than those from the US (Holt et al., 1998).

While Missouri breast cancer incidence rates were lower than those for the US, mortality rates for Missouri African Americans were above national levels. The lower incidence and higher mortality rates among African-American females may indicate that they are being screened too late or not at all.

Figure 11: Missouri Annual Age-adjusted Incidence Rates* of Breast Cancer, by Race (1985-1992)

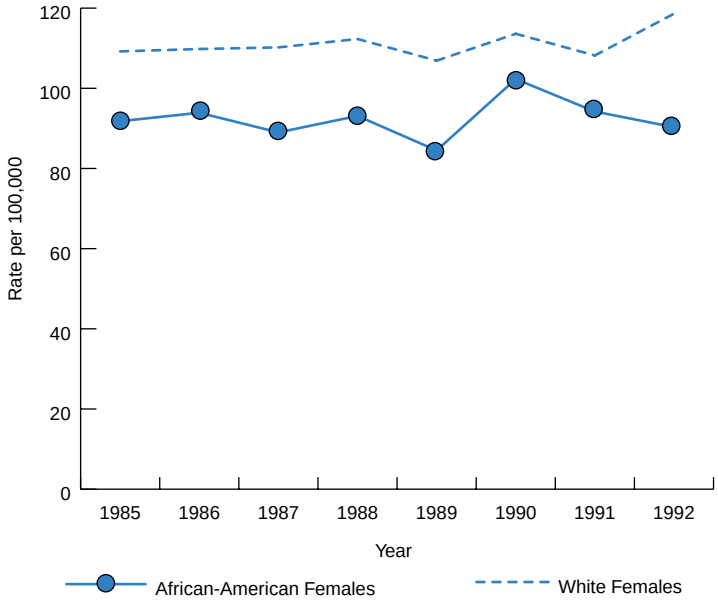
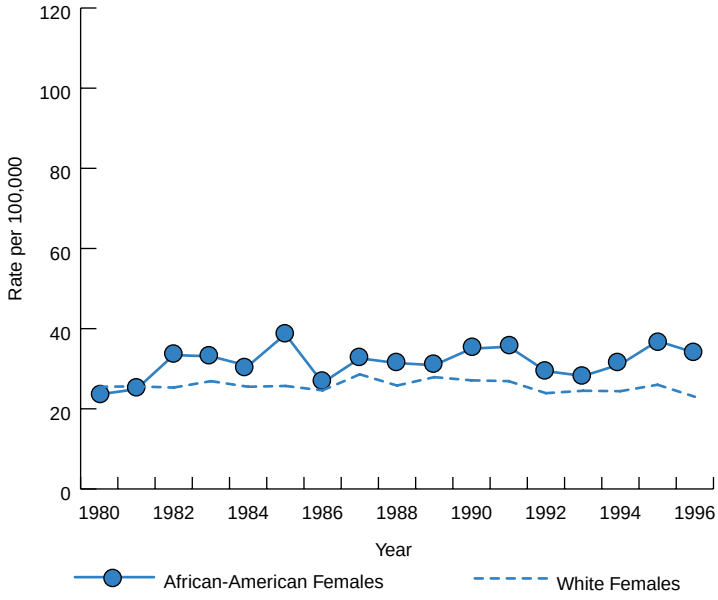


Figure 12: Missouri Annual Age-adjusted Mortality Rates* for Breast Cancer, by Race (1980-1996)



**Age Standardized to the 1970 US population*

Colorectal Cancer Incidence and Mortality

Colorectal cancer ranks third in overall incidence and mortality in Missouri and in the US.

In the period between 1985 and 1992, colorectal cancer incidence rates decreased significantly for whites (7%) (Figure 13). Rates among African Americans showed no significant change (Simoes et al., 1999b). Incidence rates for males were about 30 percent higher than for females. Similarly, incidence among Missourians 65 and over was nearly 16 times higher than in those under 65 (Stamatakis et al., 1999).

Colorectal cancer-related mortality rates declined significantly (16%) between 1980 and 1996 (Figure 14). However, in spite of declines, over the last 17 years African American mortality rates exceeded those of whites by about 41 percent (Simoes et al., 1999b). If current trends continue, projected rates indicate decreases in colorectal cancer mortality across all demographic groups. Missouri colorectal cancer incidence and mortality rates were similar to those of the US.
.

Figure 13: Missouri Annual Age-adjusted Incidence Rates* of Colorectal Cancer, by Race and Sex (1985-1992)

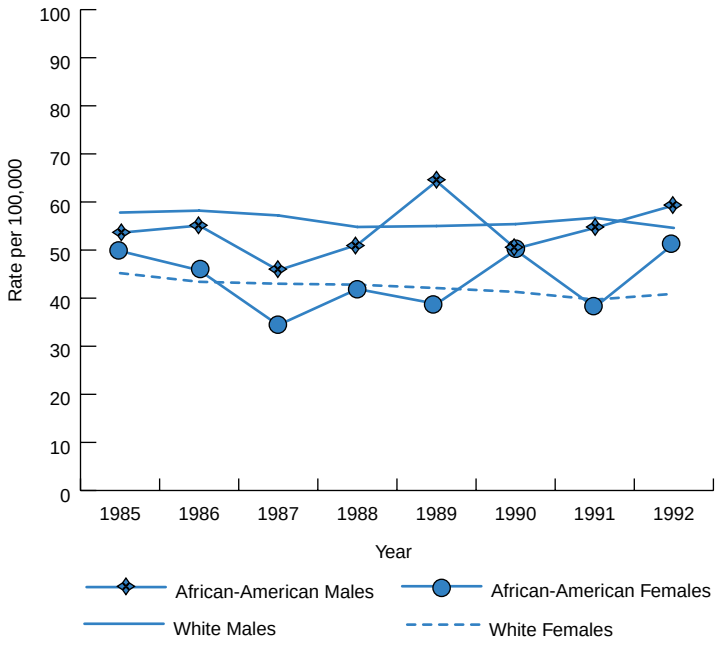
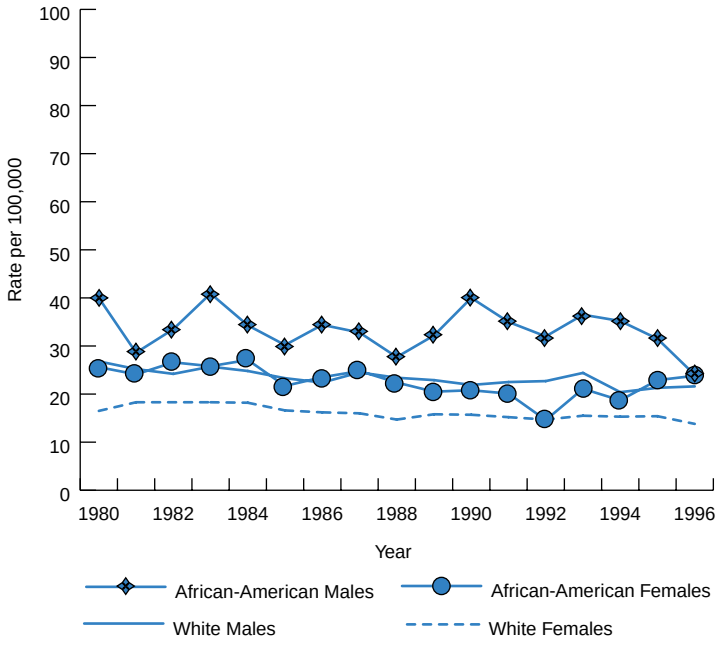


Figure 14: Missouri Annual Age-adjusted Mortality Rates* for Colorectal Cancer, by Race and Sex (1980-1996)



**Age standardized to the 1970 US population*

Cervical Cancer Incidence and Mortality

From 1985 to 1992, cervical cancer incidence rates in Missouri increased by eight percent in whites and by 20 percent in African-Americans (Figure 15). During that period, mean incidence rates for African-Americans were 33 percent greater than those of whites (Simoes et al., 1999b). The difference in race-specific incidence rates for the period was even higher among women 65 and older, with African-American women experiencing rates higher than white women.

Missouri cervical cancer mortality rates in whites decreased by 27 percent between 1980 and 1996 and by 52 percent in African Americans (Simoes et al., 1999b) (Figure 16). While there were significant decreases in cervical cancer mortality rates, mortality rates among African-American women were more than 2.5 times as high as the rates among whites. Older whites had mortality rates four times greater than younger whites. In African Americans, the difference was five-fold.

Figure 15: Missouri Annual Age-adjusted Incidence Rates* for Cervical Cancer, by Race (1985-1992)

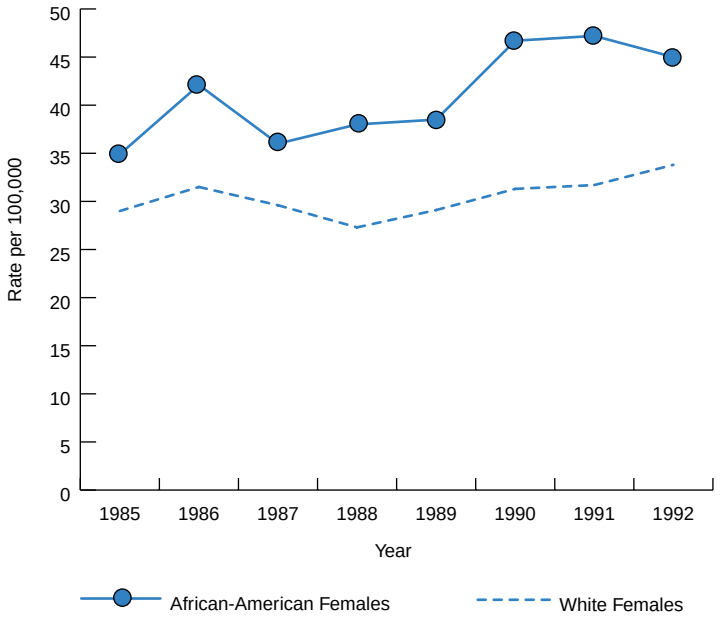
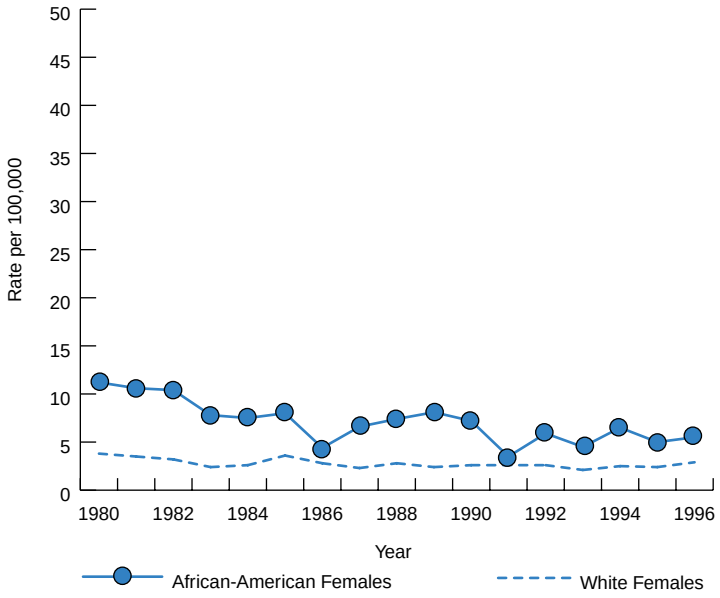


Figure 16: Missouri Annual Age-adjusted Mortality Rates* for Cervical Cancer, by Race (1980-1996)



**Age standardized to the 1970 US population*

Prostate Cancer Incidence and Mortality

Prostate cancer incidence rates for Missouri men increased significantly (126% in whites and 83% in African Americans) between 1985 and 1992 (Figure 17). The mean annual incidence rate was 16 percent higher among African Americans than among whites (Simoes et al., 1999b). Incidence rates for African-American and white males 65 and over were between 30 to 35 times higher than rates for younger males of both races (Chang et al., 1998).

Prostate cancer-related deaths rose significantly for both racial groups between 1980 and 1996 (Figure 18). Rates of mortality were 2.2 times higher for African-American males than white males. Projections based on current trends suggest continued increases in prostate cancer incidence and mortality (Simoes et al., 1999b). Because of a lack of evidence showing decreased mortality as a result of screening, there are no standards for prostate cancer screening.

Figure 17: Missouri Annual Age-adjusted Incidence Rates* for Prostate Cancer, by Race (1985-1992)

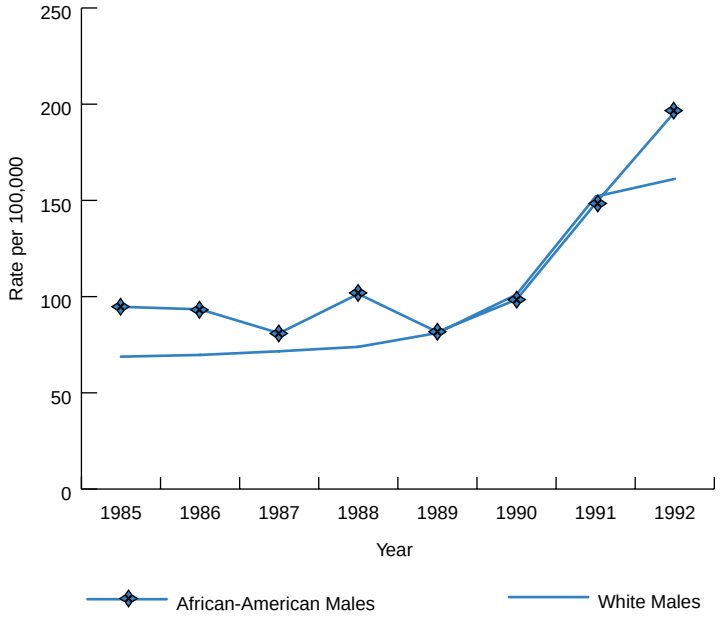
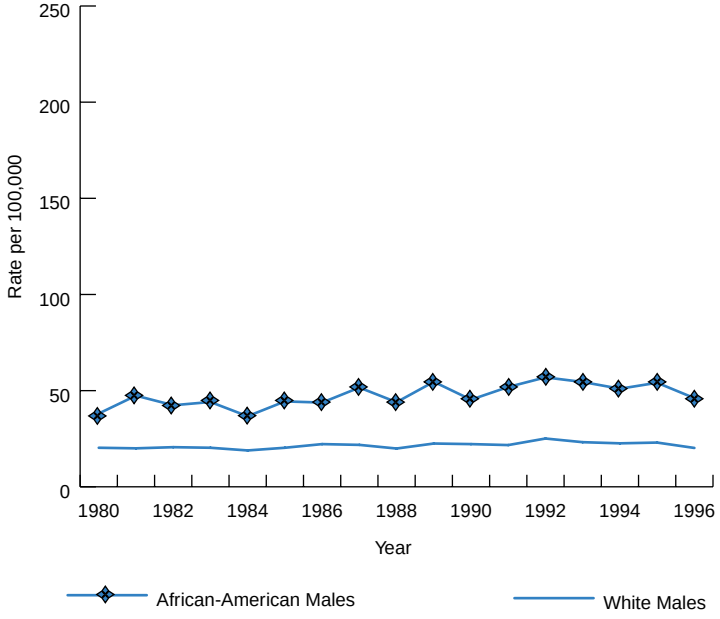


Figure 18: Missouri Annual Age-adjusted Mortality Rates* for Prostate Cancer, by Race (1980-1996)



**Age standardized to the 1970 US population*

Trends in Other Chronic Diseases

Chronic Obstructive Pulmonary Disease Mortality __ *22*

Diabetes Prevalence and Mortality _____ *23*

Smoking-attributable Mortality _____ *25*

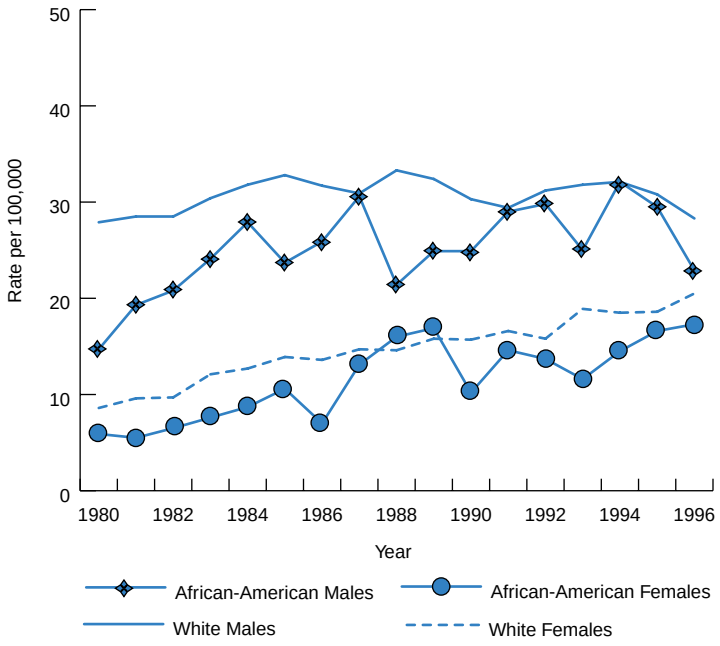
Arthritis Prevalence _____ *27*

Chronic Obstructive Pulmonary Disease Mortality

The period 1980 to 1996 saw a 41 percent increase in Chronic Obstructive Pulmonary Disease (COPD) mortality, due primarily to increases among African American and white females of 197 percent and 117 percent, respectively (Figure 19). Rates for males also increased during the same period, with the largest increase occurring among African-American males (54%) (Simoes et al., 1999b).

COPD is a disease that currently has a 24 percent greater mortality in whites than in African-Americans. Between 1980 and 1996, however, COPD mortality increased by 96 percent for African Americans, in contrast to a 38 percent increase for whites (Miller et al., 2000).

Figure 19: Missouri Annual Age-adjusted Mortality Rates for Chronic Obstructive Pulmonary Disease (COPD), by Race and Sex (1980-1996)



Diabetes Prevalence and Mortality

Prevalence

Missouri diabetes prevalence rates decreased somewhat between 1987 and 1997. Diabetes was more prevalent among the elderly, African Americans, females, former smokers and overweight individuals (Missouri Department of Health, 1998). However, guidelines for the definition of diabetes have changed and for this reason an increase may occur in the future.

Mortality

In 1998, diabetes was the sixth and seventh leading cause of death for African-American and white Missourians, respectively (Missouri Department of Health, 2000). Between 1989 and 1996, rates of underlying[1] diabetes mortality increased significantly for whites, but dropped about 10 percent among African Americans (not significant) (Figure 20). During that same period, rates of diabetes-related[2] deaths increased for all groups by gender and race (Figure 21) (Simoes et al., 1999b)

For the period 1989 through 1994, persons 75 and older accounted for over half of diabetes-related deaths, while those between 65 and 74 accounted for 28 percent.

[1]*Underlying diabetes: the cause of death is directly related to diabetes.*
[2]*Diabetes-related: the cause of death is not directly related to diabetes, but diabetes was a major factor.*

Figure 20: Missouri Annual Age-adjusted Mortality Rates for Underlying Diabetes, by Race and Sex (1989-1996)

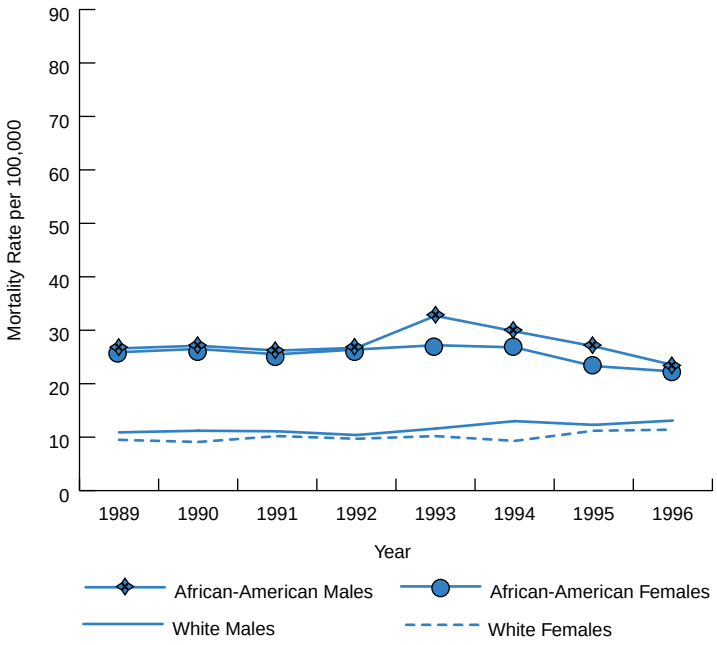
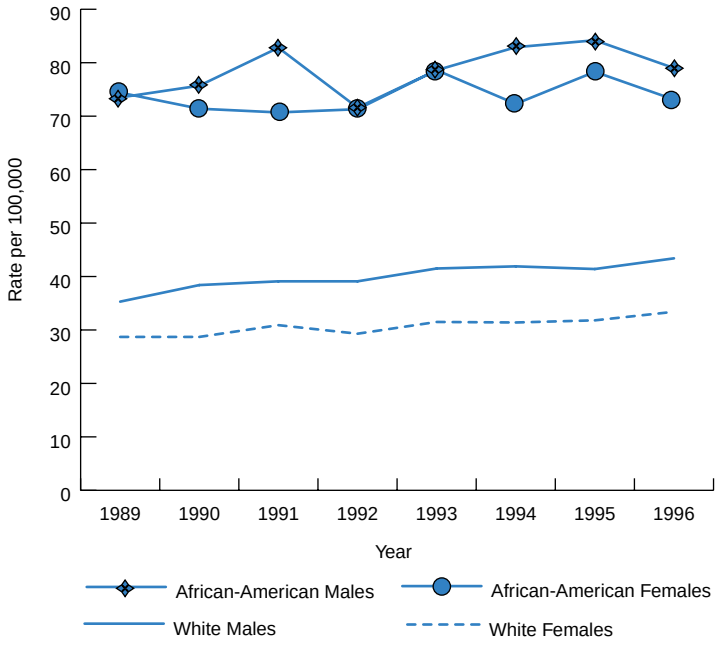


Figure 21: Missouri Annual Age-adjusted Rate for Diabetes-related Mortality, by Race and Sex (1989-1996)



Smoking-attributable Mortality

Cigarette smoking is the chief preventable cause of premature death in the US, causing 430,000 deaths annually. Each day in Missouri, smoking causes more than 28 deaths. Tobacco is a major contributor to cancer, cardiovascular disease, lung disease, low birth weight, sudden infant death syndrome (SIDS), and burns.

In 1995, approximately 19 percent of all deaths in Missouri were attributable to smoking (Miller et al., 1997). Nearly 40 percent of these deaths were due to cardiovascular disease, 30 percent were due to lung cancer, and 23 percent to respiratory disease (Figure 22). Perinatal deaths and other forms of cancer accounted for an additional 11 percent and six percent of tobacco-related deaths, respectively.

In 1995 alone, 138,951 smoking-attributable years of potential life were lost in Missouri, with 63 percent of those years lost among males (Figure 23). This means that of the 10,442 Missourians who died from smoking-related causes in 1995, each could have had his or her life extended an average of 13.3 years if he or she had never smoked (Miller et al., 1997). These figures underscore the tremendous health and economic burden caused by tobacco use.

Figure 22: Smoking-related Mortality in Missouri (1995)

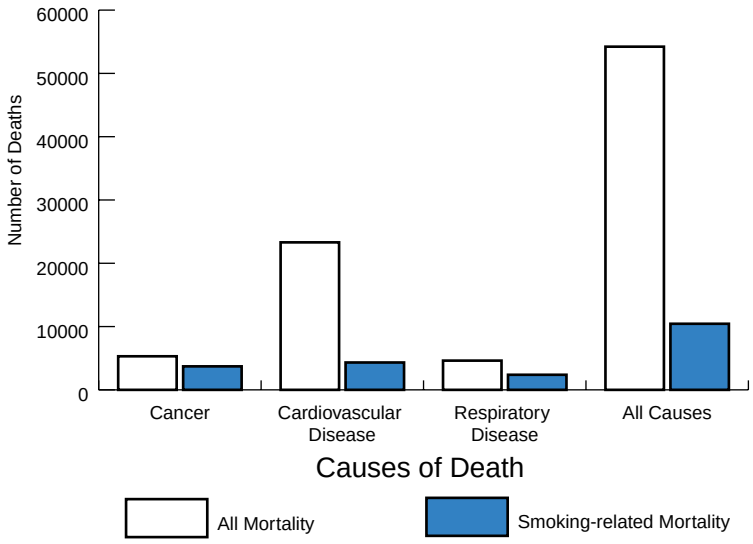
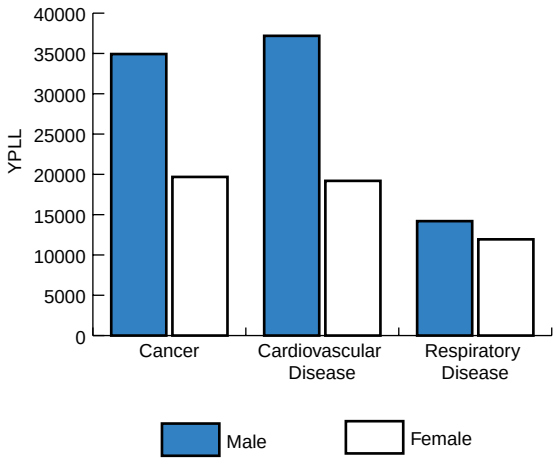


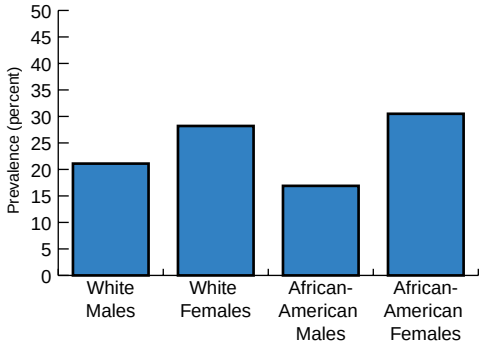
Figure 23: Smoking-attributable Years of Potential Life Lost (YPLL) in Missouri, by Disease Cause (1995)



Arthritis Prevalence

In 1996, 23 percent of Missouri's adult population had arthritis (Figure 24). Females are more likely to experience arthritis and chronic joint symptoms than males (Simoes et al., 2000). For African Americans, prevalence rates of diagnosed arthritis are higher in the cities of St. Louis, Kansas City, and the Bootheel region than in the state as a whole (Missouri Department of Health, 1999).

Figure 24: Age-Adjusted Percentage of Missouri Adults (18+ years of age) with Arthritis, by Race and Sex (1996)



Chronic Disease-related Risk Factors and Screening Tests

Chronic Disease Risk Factors

Prevalence of Smoking ____ *30*

Prevalence of Leisure-time Physical Inactivity ____ *31*

Prevalence of Overweight ____ *32*

Prevalence of Fruits and Vegetable Consumption __ *33*

Chronic Disease Screening Tests

Prevalence of Cholesterol Screening ____ *34*

Prevalence of Mamography Screening ____ *35*

Prevalence of Pap Screening ____ *37*

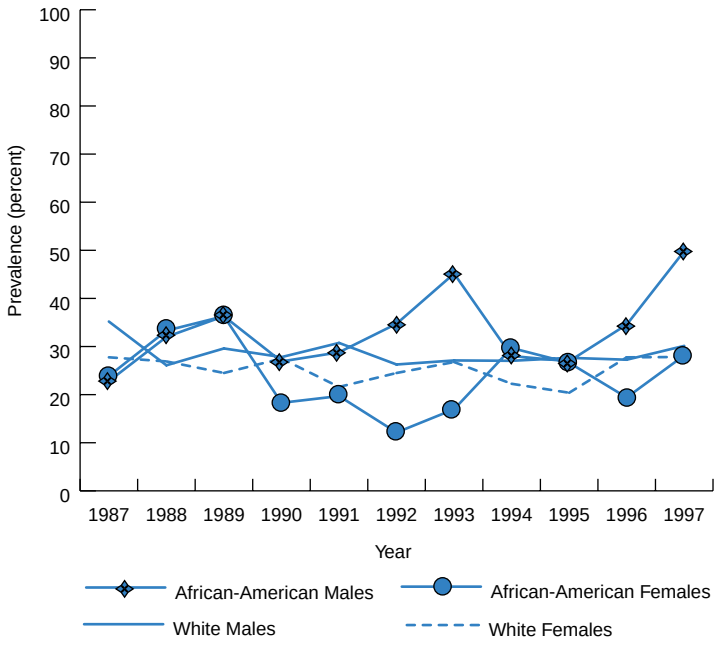
Prostate Cancer Screening Methods by Physicians _ *39*

Prevalence of Smoking

Missouri's smoking rates have been higher than the national average for some time and Missouri often ranks among the top five states in highest prevalence. During the period 1987 to 1997, Missouri's rates of current smoking among adults remained essentially unchanged (Simoes et al., 2000) (Figure 25). Smoking rates are highest among individuals age 18-34, males, and those with less than a high school education. There is no difference in smoking rates by race, controlling for age, gender, and education (Hagdrup et al., 1997b).

Missouri's adolescents also have high smoking rates. In a survey of high school students, Missouri's youth had current smoking rates of 40.3 percent (Miller, 1997).

Figure 25: Missouri Age-adjusted Weighted Prevalence of Current Smoking, by Race and Sex (1987-1997)

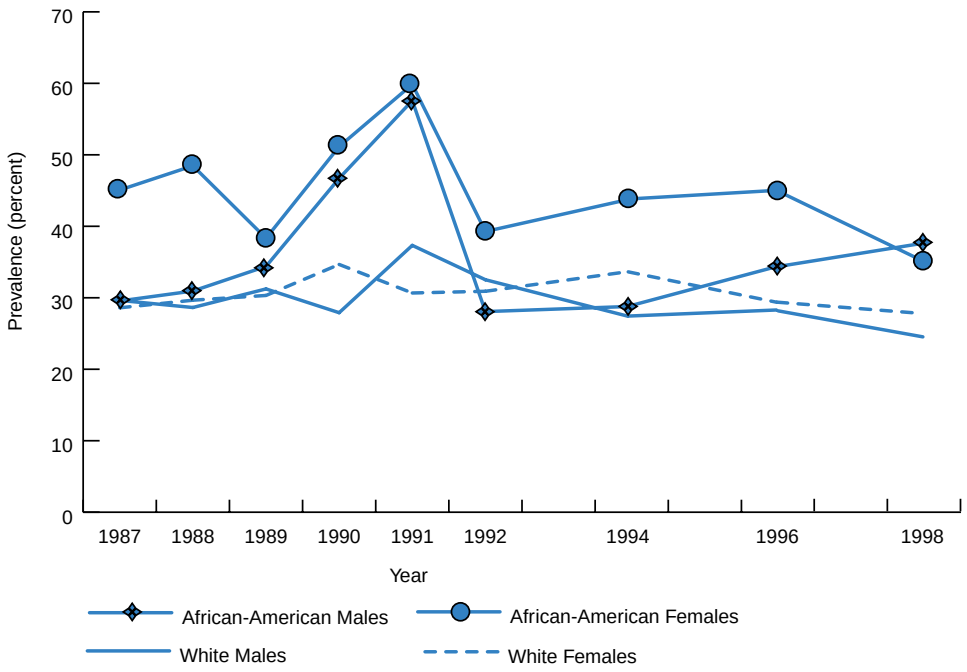


Prevalence of Leisure-time Physical Inactivity

Approximately 30 percent of Missourians are physically inactive (i.e., no leisure-time exercise within the past month). A study of Missouri's physical inactivity rates shows that there was essentially no change in these rates during the period 1987 to 1997 (Simoes et al., 2000). Physical inactivity is highest among those over age 65, females, those with less than a high school education, and African Americans (Hagdrup et al., 1997b).

An increase in levels of inactivity is predicted, with projections of 32 percent by the year 2000, thus departing from the Missouri goal of 22 percent (Figure 26) (Simoes et al., 2000). Trends in rates of inactivity for those over 65 are predicted to reach 40 percent, almost double the national goal for this age group (Hagdrup et al., 1997b).

Figure 26: Missouri Age-adjusted Weighted Prevalence of Leisure-time Physical Activity, by Race and Sex (1987-1998)*

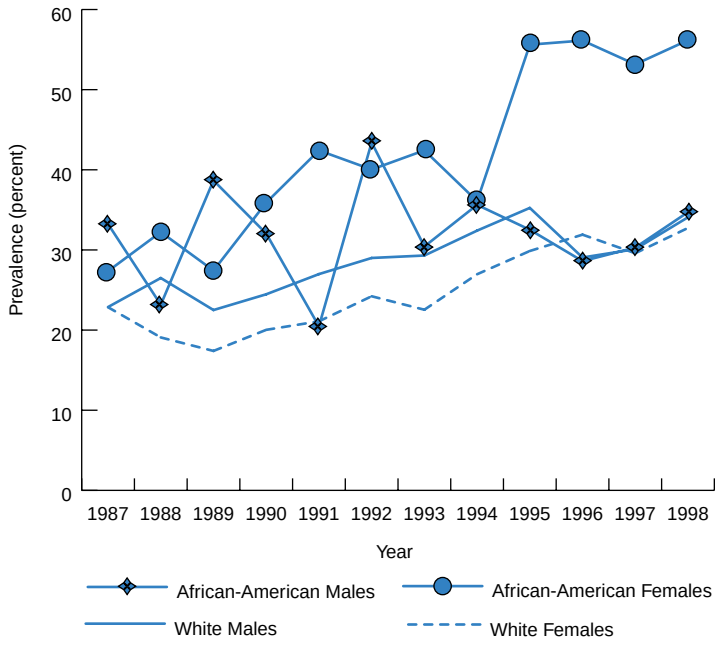


**Data on leisure-time physical activity were collected every other year following 1992*

Prevalence of Overweight

Thirty percent of Missourians were overweight in 1997 (Simoes et al., 2000). Overweight and obesity are risk factors for diabetes, hypertension, cardiovascular disease, and certain cancers. The rates are highest for those age 34-65, African Americans, those with less than a high school education, and males (Hagdrup et al., 1997b). The higher rate seen in African-Americans is predominantly an effect of rates in African-American females (Simoes et al., 2000). Overweight rates increased 45 percent overall and 99 percent in African-American females between 1987 and 1997, with continued large increases predicted in future years.

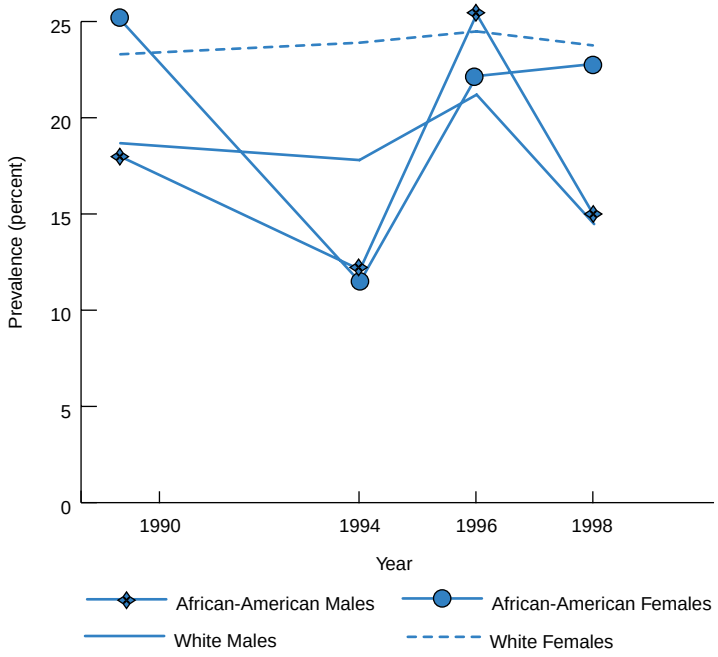
Figure 27: Missouri Age-adjusted Weighted Prevalence of Overweight, by Race and Sex (1987-1998)



Prevalence of Fruit and Vegetable Consumption

Individuals whose diets are high in fruits and vegetables have lower risks of diabetes, diverticulosis, hypertension, and gallstone formation (Hagdrup et al., 1998). Findings from the 1992-1993 Missouri Nutrition Survey and the 1990, 1994, and 1996 Behavioral Risk Factor Surveillance System surveys indicate that only 20 percent of Missourians reported eating five or more fruits and vegetables on a daily basis (Figure 28) (Simoes et al., 2000). Approximately 65 percent of individuals surveyed reported that time, effort, expense, and eating out regularly were the major barriers to increasing fruit and vegetable intake (Hagdrup et al., 1998).

Figure 28: Missouri Trends in Prevalence of Five or More Servings of Fruits and Vegetables per Day, by Race and Sex (1980-1998)*

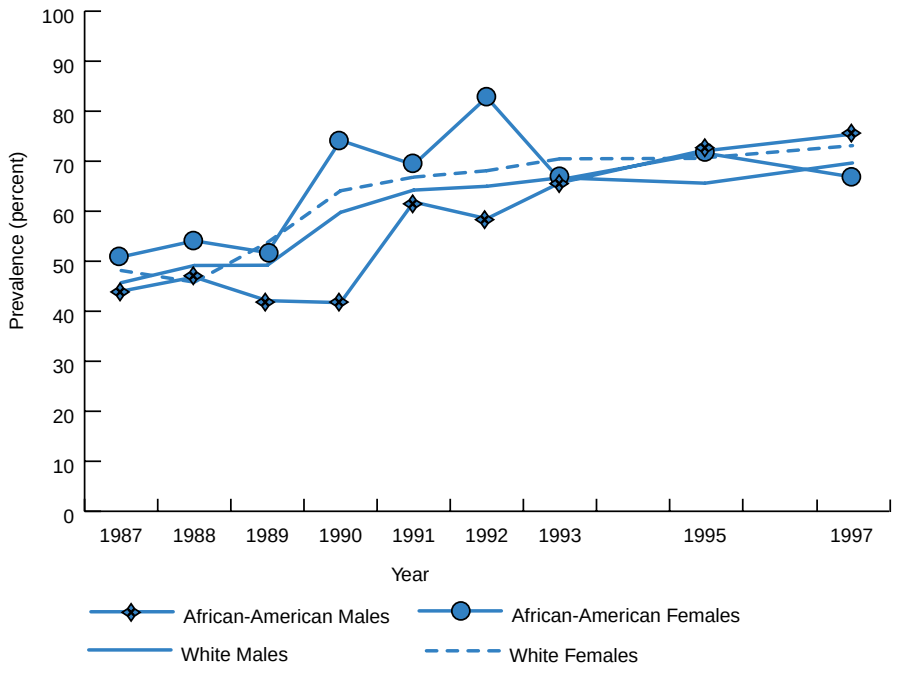


**Data were collected only for the years represented in this graph*

Prevalence of Cholesterol Screening-Ever Screened

Missouri blood cholesterol screening rates increased significantly between 1987 and 1997 (Figure 29). During that period, the mean rates of cholesterol screening was 54.7 percent overall, with the rate slightly higher for females (Simoes et al., 2000).

Figure 29: Missouri Age-adjusted Weighted Prevalence of Individuals Who Have Ever Had Their Blood Cholesterol Checked (1987-1993, 1995, 1997)



Prevalence of Mammography Screening

In 1997, 17 percent of women 40 years of age and older had never had a mammogram. Missouri achieved the Year 2000 objective for lifetime mammography screening (Figure 30) (Sarr et al., 1998).

Annual screening, especially after age 50, is recommended. However, only 70 percent of Missouri women age 50 and older had had a mammogram within the past two years. Rates of mammography compliance (every two years) among African-American women and women 50 years of age and over are predicted to exceed the Year 2000 goal of 75 percent (Figure 31) (Sarr et al., 1998). Education, age, having health care coverage, having Pap testing, and being a smoker are important predictors of mammography screening compliance for women age 50 and older (Ali-Abarghoui et al., 1998).

Figure 30: Prevalence of Lifetime Mammography Among Missouri Females by Race and Age (from 1987-1995, with projections for years 2000 & 2010)

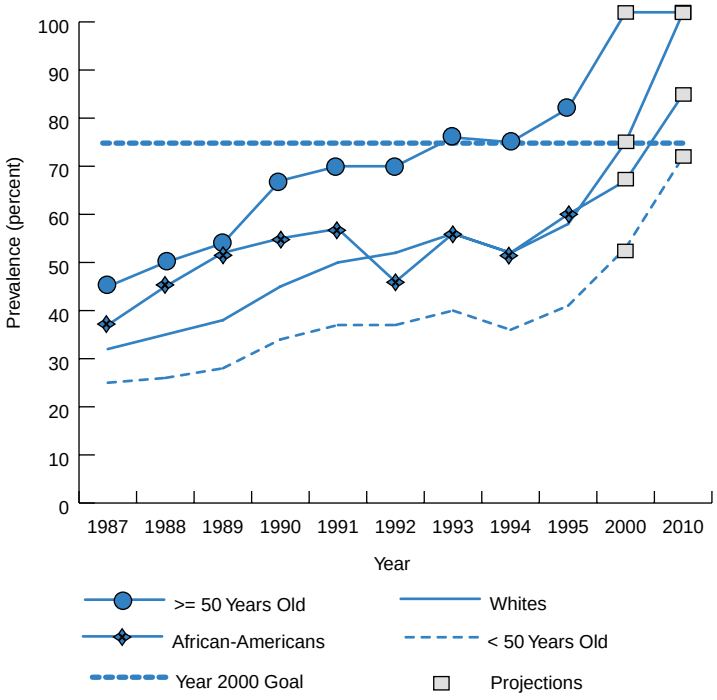
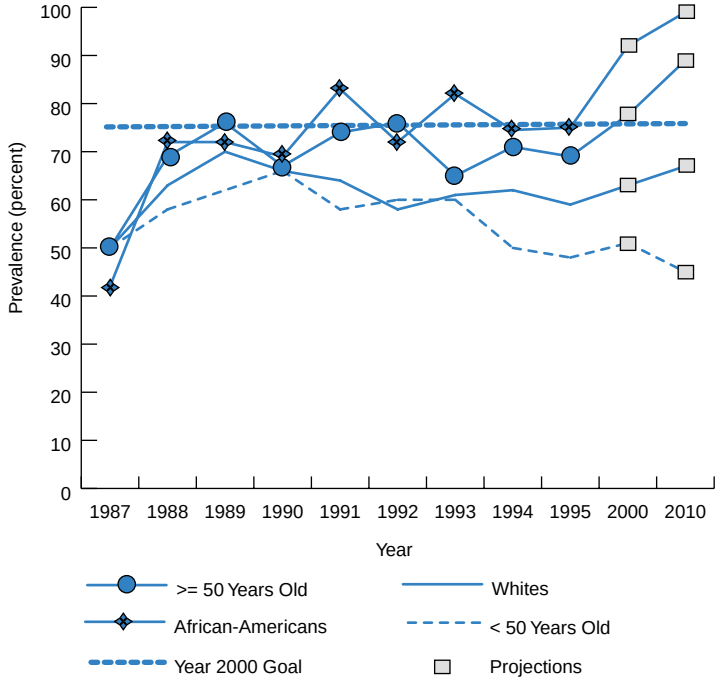


Figure 31: Prevalence of Mammography Screening Compliance (mammogram within two years) Among Missouri Females by Race and Age (1987-1995, with projections for years 2000 and 2010)



Prevalence of Pap Screening

Among Missouri women age 18 and above, 93 percent have had a pap test (Figure 32). Repeat Pap smear screening (every 3 years) is recommended. However, only 74 percent of Missouri women age 50 and older had a Pap test within the past 3 years (Simoes et al., 2000).

Lack of health coverage, failure to comply with breast cancer screening (mammogram), smoking, obesity, having less than a high school education, and failure to exercise regularly were all associated with lack of compliance to yearly Pap test requirements (Figure 33) (Simoes et al., 1999).

Mean prevalence rates of ever having had a Pap smear for Missouri females age 18 and above are predicted to increase for whites and decrease for African Americans for years 2000 through 2010 (Simoes et al., 2000).

Figure 32: Yearly Prevalence Among Missouri Females of Ever Having Had a Pap Smear, by Race (1990-1996, with projections for years 2000 and 2010)

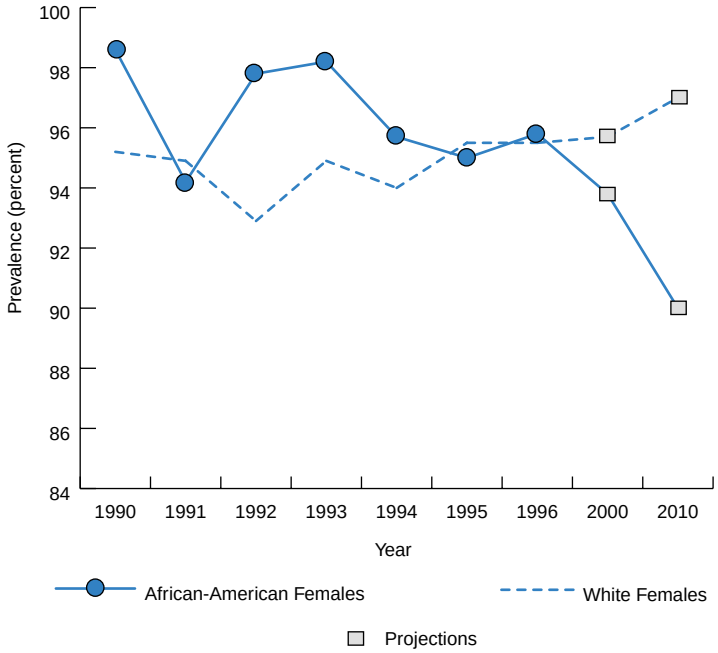
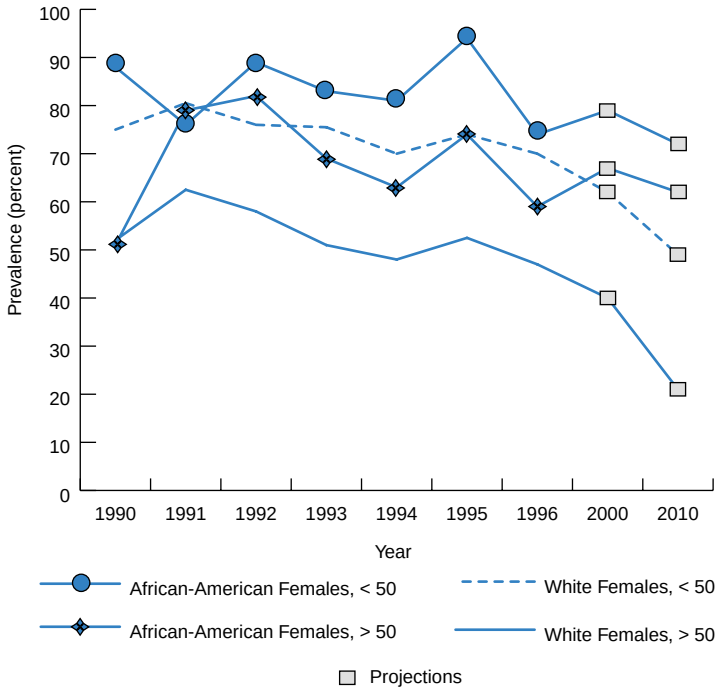


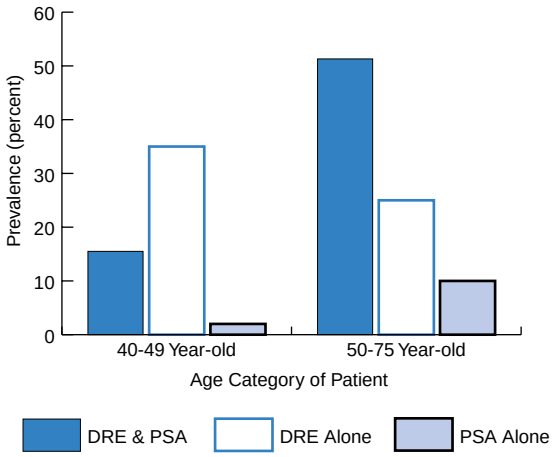
Figure 33: Yearly Prevalence in Missouri Females of Having Had a Pap Smear Within One Year of the Previous Pap, by Race and Age (1990-1996, with projections for years 2000 and 2010)



Prostate Cancer Screening Methods Used By Physicians

In 1993, the Missouri Department of Health conducted a stratified random sample survey of 750 primary care physicians to determine the use of prostate-specific antigen testing (PSA) and digital rectal examination (DRE) (Lawson, et.al., 1998). Ninety-four percent of physicians surveyed reported being more inclined in 1993 to screen asymptomatic patients using PSA testing than there were three years earlier. Forty-four percent were more likely to use DRE in 1993 than three years earlier. For patients under 50 years of age, DRE alone was the most common screening method, whereas in patients older than 50, DRE in combination with PSA was used more frequently (Figure 34).

Figure 34: Prevalence of Prostate Screening Methods Among Missouri Physicians for Screening Asymptomatic Men, by Age Category of Patients (1993)



Special Topics

Missouri's Aging Population _____ *42*

Health Care Coverage _____ *44*

Chronic Disease Risks Among Youth _____ *45*

Missouri's Aging Population

In 1998, Missourians age 60+ were 18 percent of the population and the state has the 12th largest aging population in the US (Missouri Division of Aging, 1998). Population projections show that from 1995-2025, the age 60+ population is expected to increase 75 percent (Missouri Division of Aging, 1998). Along with the sheer number of older Missourians will be a huge increase in the number of elderly minorities as the proportion of older African-Americans doubles and the Hispanic elderly population increases by nearly 300 percent—primarily due to increased life expectancy and migration (Table 1).

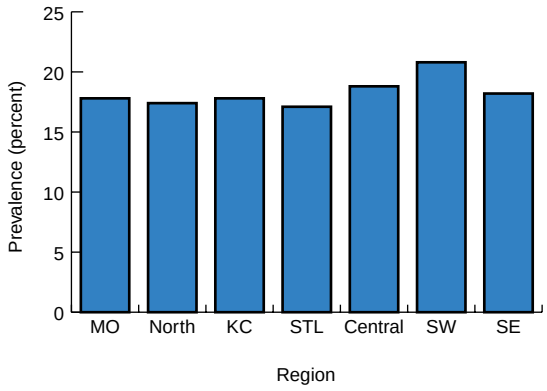
Chronic illnesses and related activity limitations reduce functioning, cognitive impairments, depressive symptoms, and increase the need for in-patient care, extended care, and burdensome health-care costs (Salive et al., 1997). In Missouri, chronic illness, activity limitation, morbidity and mortality rates are highest among the elderly and vary by region (Figure 35)(Missouri Department of Health, 2000). The prevalence of activity limitation after age 65 is 32 percent among Missouri whites, while 35 percent of African Americans require assistance in completing daily needs (Missouri Department of Health, 1998).

Table 1 Projected changes in Missouri's Aging population 1995-2025

	1995 (Population in thousands)	2025 (Population in thousands)	% change
Total Population	5324	6250	17.7
Age 60+	959	1674	74.5
Female 60+	559	907	62.3
African American 60+	70	140	99.8
Hispanic 60+	7	26	296.9
Other 60+	6	22	266.6

Source: Missouri Division of Aging, 1998

Figure 35: Activity Limitation in Missouri, 1998—by Region

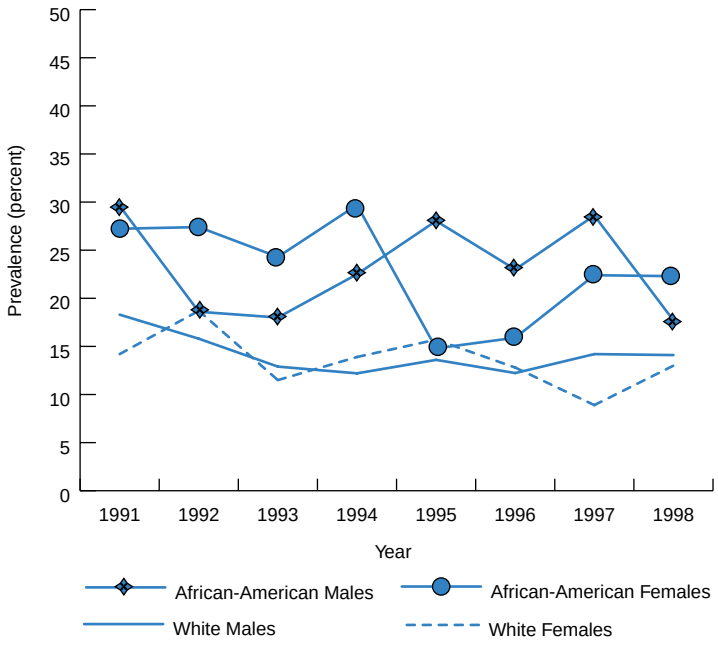


Health Care Coverage

Nearly 16 percent of Missourians were without health care coverage each year between 1991 and 1997 (Hagdrup, et. al., 1997). During that period, mean prevalence rates for lack of health care coverage were 54 percent higher for African Americans than for whites (Figure 36). While the rates of those un-insured decreased significantly for whites, the rates in African-American men increased 10 percent annually (Simoes et al., 2000).

Age is a strong predictor of insurance coverage, with the lowest rates of coverage among individuals 18-44 years of age. Lack of exercise and smoking are also correlated with lack of health care coverage. In addition, there is an association between lack of compliance with screening tests for breast cancer, cervical cancer, high blood cholesterol, and the lack of health care coverage.

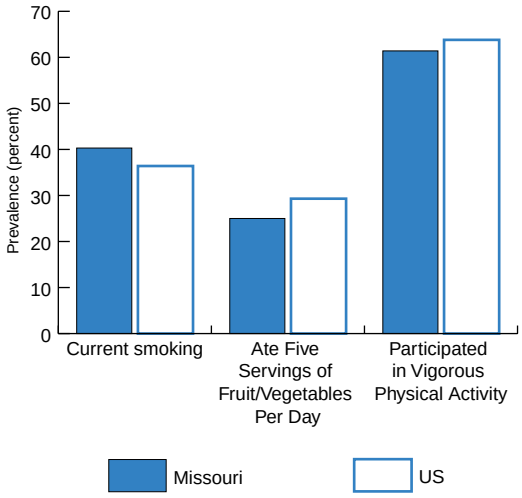
Figure 36: Missouri Age-adjusted Weighted Prevalence of Individuals with No Health Care Coverage, by Race and Sex (1991-1998)



Chronic Disease Risks Among Youth

Results of the 1997 Youth Risk Behavior Survey (YBRS) indicate that Missouri high school students (grades 9-12) exhibit risk factors related to the development of chronic diseases, namely smoking, poor diet, obesity, and inactivity (Figure 37). For example, Missouri high school students rank 5th (1997) in the nation for rates of current smoking, are less likely to eat five servings of fruits and vegetables, and participate in vigorous physical activity less than US youths (Center for Disease Control and Prevention, 1998).

Figure 37: Prevalence of Three Risk Factors in Missouri and US High School Youths (1997)



References

Ali-Abarghoui F, Simoes EJ, Newschaffer CJ, Tao X, Mack NE, Brownson RC. Predictors of mammography utilization in Missouri, 1993-1994. J. Public Health Management Practice 1998; 4:29-42.

Centers for Disease Control and Prevention (2000). 1997 Behavior Risk Factor Surveillance System data. On-line at: http://www2.cdc.gov/nccdphp/brfss/index.asp

Centers for Disease Control and Prevention. Missouri's Youth Risk Behavior Survey results-1997. Morbidity and Mortality Weekly Report 47 1998; (#SS-3).

Chang JC, Simoes EJ, Jackson-Thompson J, Malone B. Time trends of prostate cancer in Missouri, United States. Proceedings of the 17th International Cancer Congress, 1998; Rio de Janeiro (Brazil) August 24-28:1069-1073.

Hagdrup NA, Simoes EJ, Brownson RC. Fruit and vegetable consumption in Missouri: Knowledge, barriers, and benefits. Am. J. Health Behav. 1998; 22:90-100.

Hagdrup NA, Simoes EJ, Brownson RC. Health Care Coverage: Traditional and preventive measures and associations with chronic disease risk factors. Journal of Community Health 1997a; 22:387-399

Hagdrup NA, Simoes EJ, Brownson RC. Selected chronic disease risk factors in Missouri: 10-year trends and predictions for the year 2000. American Journal of Preventive Medicine 1997b; 13:45-50.

Hahn RA, Teutsch SM, Rothenburg RB, Marks JS. Excess deaths from chronic diseases in the United States. JAMA 1986; 264:2654-2659.

Holt BM, Simoes EJ, Chang J, Jackson-Thompson J. Breast cancer incidence and mortality trends in Missouri. Missouri Medicine 1998; 95:165-169

Kerlikowsky K, Grady D, Rubin SM, et al. Efficacy of screening mammography: A meta-analysis. JAMA 1995; 273:149-154.

Lawson D, Simoes EJ, Sharp D, Murayi T, Hagan R, Brownson RC, Wilkerson J. Prostate cancer screening- A physician survey in Missouri. Journal of Community Health 1998; 23:347-358.

Manton KG, Stallard E, Corder L. Changes in morbidity and chronic disability in the US elderly population: Evidence from the 1982, 1984, and 1989 national long-term care surveys. J Gerontology 1995; 50B:S194-S204.

McGinnis JM, Foege WH. Actual causes of death in the United States. JAMA 1993; 270:2207-2212.

Miller N, Simoes EJ, Chang JC, Robling AG. Trends in chronic obstructive pulmonary disease mortality. Missouri Medicine 2000; 97:87-90.

Miller N, Simoes EJ, Chang JC. Trends in Missouri lung cancer rates. Missouri Medicine 1999; 96:57-61.

Miller N, Murayi T, Simoes EJ. Tobacco use among Missouri high school students, 1995. Missouri Medicine 1997; 94:332-7.

Miller N, Simoes EJ, Chang JC. Smoking-attributable mortality in Missouri, 1995. Missouri Medicine 1997; 94:661-5.

Missouri Division of Aging. Report on Missouri Aging Population-1998. Author: Jefferson City, MO.

Missouri Department of Health (2000). Missouri Information for Community Assessment (MICA)- Death Records. On-line at: http://www.health.state.mo.us/BobCOD/allcodd.html

Missouri Department of Health (1999). Prevalence of activity limitation and arthritis among African-Americans in the city of St. Louis, Kansas City, and the Bootheel region of Missouri.

Missouri Department of Health (1998). Analysis of 1987-1997 Missouri Behavior Risk Factor Surveillance System data. Unpublished.

Missouri Department of Health. Results of the 1998 Behavioral Risk Factor survey, 1999. Author: Jefferson City, MO.

Robling AG, Simoes EJ, Chang JC, Jackson-Thompson J, Brownson RC. Trends in cancer incidence and mortality in Missouri, 1985-1992: Predictions for Year 2000. Missouri Medicine 1998; 95:607-16.

Salive ME, Guralnik JM. Disability outcomes of chronic disease and their implications for public health. In: Hickey T, Speers MA, Prohaska TR, eds. Public health and aging. Baltimore, MD: The Johns Hopkins University Press, 1997:87-106.

Sarr M, Simoes EJ, Murayi T, Figgs LT, Brownson RC. Trends in breast cancer screening in Missouri from 1987 to 1995, and predictions for the years 2000 and 2010. Missouri Medicine 1998; 95:663-9.

Simoes EJ, et al (2000-in press). Chronic disease data for decision making and planning Volume II: Chronic disease risk factors trends and predictions. Columbia, MO: Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, Office of Surveillance, Research and Evaluation.

Simoes EJ, Newschaffer CJ, Hagdrup N, Ali-Abarghoui F, Tao X, Mack N, Brownson RC. Predictors of compliance with recommended cervical cancer screening schedule: A population-based study. Journal of Community Health 1999a; 24:115-30.

Simoes EJ, Robling AG, Miller N, Chang JC, Jackson-Thompson J (1999b). Chronic disease data for decision making and planning Volume I: Incidence and mortality trends and predictions. Columbia, MO: Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, Office of Surveillance, Research and Evaluation.

Sprick AN, Simoes EJ, McKeage CB, Chang JC. Diabetes-related deaths in Missouri 1989-1994. Missouri Medicine 1998; 95:21-5.

Stamatakis KA, Simoes EJ, Chang J. Trends and patterns in colorectal cancer incidence and mortality in Missouri. Missouri Medicine 1999; 96:455-461.

Vita AJ, Terry RB, Hubert HB, Fries JF. Aging, health risks, and cumulative disability. NJEM 1998; 338:1035-1041.

World Cancer Research Fund. Food, nutrition and the prevention of cancer: a global perspective. World Cancer Research Fund in association with American Institute for Cancer Research, 1997. Washington, D.C.

Missouri Department of Health
Chronic Disease Published Research

Arthritis

Missouri Department of Health and University of Missouri-Columbia School of Medicine. Prevalence of activity limitation and arthritis among African Americans in the city of St. Louis, Kansas City and the Bootheel region of Missouri. Monograph No. 2. Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion 1999. Not available electronically.*

Cancer

Simoes EJ, Kinman E, Chang J. Sugar Creek cancer inquiry report level three investigation. Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 2000.

1998 Behavioral Risk Factor Surveillance System (BRFSS) Regional Data Summary, Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 2000.

Simoes EJ, Robling AG, Miller N, Chang JC, Jackson-Thompson J. Chronic disease data for decision making and planning, Volume I: Incidence and mortality trends and projections. Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 1999.

Stamatakis KA, Simoes EJ, Chang J. Trends and patterns in colorectal cancer incidence and mortality in Missouri. Mo Med September 1999;96(9):455-461.

Simoes E. Thyroid cancer in Missouri HTML PDF . Risk Excellence Notes, U.S. Department of Energy Center for Risk Excellence and Lane Environmental, Inc. 1999;1(5):10.

Simoes EJ, Newschaffer CJ, Hagdrup N, Ali-Abarghoui F, Tao X, Mack N, Brownson RC,. Predictors of compliance with recommended cervical cancer screening schedule: A population-based study. J Comm Health.1999;24(2):115-130. Not available electronically.*

Miller N, Simoes EJ, Chang JC. Trends in Missouri lung cancer rates. Mo Med. Februray 1999;96(2):57-61.

Sarr M, Simoes E J, Murayi T, Figgs LT, Brownson RC. Trends in breast cancer screening in Missouri from 1987 to 1995, and predictions for the years 2000 and 2010. Mo Med December 1998;95(12):663-669.

Robling AG, Simoes EJ, Chang JC, Jackson-Thompson J, Brownson RC. Trends in cancer incidence and mortality in Missouri. Mo Med November 1998;95(11):607-616.

Chang JC, Simoes EJ, Jackson-Thompson J, Malone B. Time trends of prostate cancer in Missouri, United States. Proceedings of the 17th International Cancer Conference, Rio de Janeiro, Brazil, August 1998.

Ali-Abarghoui F, Simoes EJ, Newschaffer CJ, Tao X, Mack NE, Brownson RC. Predictors of mammography utilization in Missouri, 1993-1994. J Public Health Manag Pract 1998;4(3):29-42. Not available electronically.*

Holt BM, Simoes E J, Chang J, Jackson-Thompson J. Breast cancer incidence and mortality trends in Missouri. Mo Med. April 1998;95(4):165-169.

Lawson DA, Simoes EJ, Sharp DC, Murayi T, Hagan R, Brownson RC, Wilkerson J. Prostate cancer screening: A physician survey in Missouri Journal of Community Health 1998;23:347-358. Not available electronically.*

Hagdrup NA, Simoes EJ, Brownson RC. Health care coverage: traditional and preventive measures and associations with chronic disease risk factors. J Community Health 1997;22(5):387-399.

Cardiovascular Disease

Dietz M, Simoes E. Racial/ethnic differences in the prevalence of modifiable cardiovascular disease risk factors in three regions of the Missouri, 1996, Monograph #4. Columbia, MO: Missouri Department of Health, Office of Surveillance, Research, and Evaluation, 2000.

1998 Behavioral Risk Factor Surveillance System (BRFSS) Regional Data Summary, Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 2000.

Dietz, M., Simoes, EJ., Waterman, B. 1999. Changes in modifiable cardiovascular disease risk factors among African Americans in the city of St. Louis, Kansas City and the Bootheel region of Missouri, 1990-1996. Monograph Series # 3. Columbia, MO: Missouri Department of Health, Office of Surveillance, Research, and Evaluation.

Simoes EJ, Robling AG, Miller N, Chang JC, Jackson-Thompson J. Chronic disease data for decision making and planning, Volume I: Incidence and mortality trends and projections. Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 1999.

Dietz MJ, Simoes E J, Waterman B, Jackson-Thompson J, Murayi T. Prevalence changes in modifiable cardiovascular disease risk factors in three Missouri regions, 1990-1996. Mo Med December 1998;95(12):654-662.

Hagdrup NA, Simoes EJ, Brownson RC. Health care coverage: traditional and preventive measures and associations with chronic disease risk factors. J Community Health 1997;22(5):387-399.

Hagdrup NA, Simoes EJ, Brownson RC. Selected chronic disease risk factors in Missouri: Ten year trends and predictions for year 2000. Am J Prev Med 1997;13(6):prepublication draft.

Chronic Obstructive Pulmonary Disease

Miller N, Simoes EJ, Chang JC, Robling AG. Trends in chronic obstructive pulmonary disease mortality. Mo Med March 2000;97(3):87-90.

Simoes EJ, Robling AG, Miller N, Chang JC, Jackson-Thompson J. Chronic disease data for decision making and planning, Volume I: Incidence and mortality trends and projections. Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion,1999.

Diabetes

1998 Behavioral Risk Factor Surveillance System (BRFSS) Regional Data Summary, Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 2000.

Simoes EJ, Robling AG, Miller N, Chang JC, Jackson-Thompson J. Chronic disease data for decision making and planning, Volume I: Incidence and mortality trends and projections. Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 1999.

Sprick AN, Simoes E J, McKeage CB, Chang JC. Diabetes-related deaths in Missouri 1989-1994. Mo Med January 1998;95(1):21-25.

Missouri Department of Health. Prevalence of diabetes among African Americans in the city of St. Louis, Kansas City and the Bootheel region of Missouri. Monograph No. 1. Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 1997. Not available electronically.*

Hagdrup NA, Simoes EJ, Brownson RC. Health care coverage: traditional and preventive measures and associations with chronic disease risk factors. J Community Health 1997;22(5):387-399.

Hagdrup NA, Simoes EJ, Brownson RC. Selected chronic disease risk factors in Missouri: Ten year trends and predictions for year 2000. Am J Prev Med 1997;13(6):prepublication draft.

Risk Factors

Cancer Screening

1998 Behavioral Risk Factor Surveillance System (BRFSS) Regional Data Summary, Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 2000.

Simoes EJ, Newschaffer CJ, Hagdrup N, Ali-Abarghoui F, Tao X, Mack N, Brownson RC,. Predictors of compliance with recommended cervical cancer screening schedule: A population-based study. J Comm Health.1999;24(2):115-130. Not available electronically.*

Sarr M, Simoes E J, Murayi T, Figgs LT, Brownson RC. Trends in breast cancer screening in Missouri from 1987 to 1995, and predictions for the years 2000 and 2010. Mo Med December 1998;95(12):663-669.

Ali-Abarghoui F, Simoes EJ, Newschaffer CJ, Tao X, Mack NE, Brownson RC. Predictors of mammography utilization in Missouri, 1993-1994. J Public Health Manag Pract 1998;4(3):29-42. Not available electronically.*

Lawson DA, Simoes EJ, Sharp DC, Murayi T, Hagan R, Brownson RC, Wilkerson J. Prostate cancer screening: A physician survey in Missouri Journal of Community Health 1998;23:347-358. Not available electronically.*

Hagdrup NA, Simoes EJ, Brownson RC. Health care coverage: traditional and preventive measures and associations with chronic disease risk factors. J Community Health 1997;22(5):387-399.

Cardiovascular Screening

Dietz M, Simoes E. Racial/ethnic differences in the prevalence of modifiable cardiovascular disease risk factors in three regions of the Missouri, 1996, Monograph #4. Columbia, MO: Missouri Department of Health, Office of Surveillance, Research, and Evaluation, 2000.

1998 Behavioral Risk Factor Surveillance System (BRFSS) Regional Data Summary, Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 2000.

Dietz, M., Simoes, EJ., Waterman, B. 1999. Changes in modifiable cardiovascular disease risk factors among African Americans in the city of St. Louis, Kansas City and the Bootheel region of Missouri, 1990-1996. Monograph Series # 3. Columbia, MO: Missouri Department of Health, Office of Surveillance, Research, and Evaluation.

Dietz MJ, Simoes E J, Waterman B, Jackson-Thompson J, Murayi T. Prevalence changes in modifiable cardiovascular disease risk factors in three Missouri regions, 1990-1996. Mo Med December 1998;95(12):654-662.

Hagdrup NA, Simoes EJ, Brownson RC. Health care coverage: traditional and preventive measures and associations with chronic disease risk factors. J Community Health 1997;22(5):387-399.

Nutrition

1998 Behavioral Risk Factor Surveillance System (BRFSS) Regional Data Summary, Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 2000.

Hagdrup NA, Simoes EJ, Brownson RC. Fruit and vegetable consumption in Missouri: Knowledge, barriers and benefits. Am J Health Behav 1998;22(2):90-100. Not available electronically.*

Hagdrup NA, Simoes EJ, Brownson RC. Selected chronic disease risk factors in Missouri: Ten year trends and predictions for year 2000. Am J Prev Med 1997;13(6):prepublication draft.

Obesity

Kabeer NH, Simoes EJ, Murayi T, and Brownson RC. Correlates of Overweight and Weight Loss Practices in Missouri. Am J Health Behav. (in press) Not available electronically.*

Dietz M, Simoes E. Racial/ethnic differences in the prevalence of modifiable cardiovascular disease risk factors in three regions of the Missouri, 1996, Monograph #4. Columbia, MO: Missouri Department of Health, Office of Surveillance, Research, and Evaluation, 2000.

1998 Behavioral Risk Factor Surveillance System (BRFSS) Regional Data Summary, Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 2000.

Dietz, M., Simoes, EJ., Waterman, B. 1999. Changes in modifiable cardiovascular disease risk factors among African Americans in the city of St. Louis, Kansas City and the Bootheel region of Missouri, 1990-1996. Monograph Series # 3. Columbia, MO: Missouri Department of Health, Office of Surveillance, Research, and Evaluation.

Dietz MJ, Simoes E J, Waterman B, Jackson-Thompson J, Murayi T. Prevalence changes in modifiable cardiovascular disease risk factors in three Missouri regions, 1990-1996. Mo Med December 1998;95(12):654-662.

Hagdrup NA, Simoes EJ, Brownson RC. Selected chronic disease risk factors in Missouri: Ten year trends and predictions for year 2000. Am J Prev Med 1997;13(6):prepublication draft.

Physical Inactivity

Dietz M, Simoes E. Racial/ethnic differences in the prevalence of modifiable cardiovascular disease risk factors in three regions of the Missouri, 1996, Monograph #4. Columbia, MO: Missouri Department of Health, Office of Surveillance, Research, and Evaluation, 2000.

1998 Behavioral Risk Factor Surveillance System (BRFSS) Regional Data Summary, Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 2000.

Dietz, M., Simoes, EJ., Waterman, B. 1999. Changes in modifiable cardiovascular disease risk factors among African Americans in the city of St. Louis, Kansas City and the Bootheel region of Missouri, 1990-1996. Monograph Series # 3. Columbia, MO: Missouri Department of Health, Office of Surveillance, Research, and Evaluation.

Dietz MJ, Simoes E J, Waterman B, Jackson-Thompson J, Murayi T. Prevalence changes in modifiable cardiovascular disease risk factors in three Missouri regions, 1990-1996. Mo Med December 1998;95(12):654-662.

Hagdrup NA, Simoes EJ, Brownson RC. Selected chronic disease risk factors in Missouri: Ten year trends and predictions for year 2000. Am J Prev Med 1997;13(6):prepublication draft.

Smoking

Dietz M, Simoes E. Racial/ethnic differences in the prevalence of modifiable cardiovascular disease risk factors in three regions of the Missouri, 1996, Monograph #4. Columbia, MO: Missouri Department of Health, Office of Surveillance, Research, and Evaluation, 2000.

1998 Behavioral Risk Factor Surveillance System (BRFSS) Regional Data Summary, Missouri Department of Health, Division of Chronic Disease Prevention and Health Promotion, 2000.

Miller N, Simoes EJ, Chang JC, Robling AG. Trends in chronic obstructive pulmonary disease mortality. Mo Med March 2000;97(3):87-90.

Miller N, Murayi T, Simoes E J. Tobacco use among Missouri high school students, 1995. Mo Med July 1997;94(7):332-337.

Miller N, Simoes E J, Chang J. Smoking-attributable mortality in Missouri, 1995. Mo Med November 1997;94(11):661-665.

Hagdrup NA, Simoes EJ, Brownson RC. Health care coverage: traditional and preventive measures and associations with chronic disease risk factors. J Community Health 1997;22(5):387-399.

Hagdrup NA, Simoes EJ, Brownson RC. Selected chronic disease risk factors in Missouri: Ten year trends and predictions for year 2000. Am J Prev Med 1997;13(6): prepublication draft.

***Reprints or copies of articles and reports may be obtained from:**

Division of Chronic Disease Prevention and Health Promotion
Missouri Department of Health
920 Wildwood, P.O. Box 570
Jefferson City, Mo 65102-0570
Ph: (573) 522-2800.